III. Extent of licit trade and latest trends in trafficking in precursors

86. The present chapter provides an overview of the major trends and developments in both licit trade and trafficking in precursor chemicals, by substance group. It summarizes information on seizures and cases of diversion or attempted diversion from international trade, as well as activities associated with illicit drug manufacture, with a view to addressing gaps and weaknesses in precursor control mechanisms. The chapter is based on information provided to the Board through various mechanisms, such as form D, the PEN Online system, PICS, Project

Prism and Project Cohesion, and through national reports and other official information from Governments.

87. The present chapter also provides information about non-scheduled chemicals, including designer precursors, that, despite not being included in the tables of the 1988 Convention, are nonetheless used in illicit drug manufacture. In the present report, information on these substances is generally presented in dedicated subsections, but may also be found in the sections providing details on trends with regard to substances in Table I and Table II of the 1988 Convention, especially in cases where the non-scheduled chemicals being discussed are part of a more complex development. Information on substances not included in Table I or Table II of the 1988 Convention is reported to INCB pursuant to article 12, subparagraph 12 *(b)*, of the Convention. It is also shared through PICS, which has thus developed into an early warning system for precursors.

88. Overall, trafficking in controlled precursors appears to have remained largely unaffected by the restrictions on movement resulting from the COVID-19 pandemic, as no permanent shifts or trends in precursor trafficking have been attributed to the pandemic.

A. Substances used in the illicit manufacture of amphetamine-type stimulants

1. Substances used in the illicit manufacture of amphetamines

(a) Ephedrine and pseudoephedrine

89. Ephedrine and pseudoephedrine are precursors used in the illicit manufacture of methamphetamine but can be substituted with P-2-P, phenylacetic acid, APAAN, APAA, MAPA and a number of non-scheduled substances (see subsects. *(c)* and *(d)* below, and annex VIII). Both ephedrine and pseudoephedrine are also used for legitimate medical purposes and are therefore among the most frequently and widely traded substances included in Table I of the 1988 Convention.

Licit trade

90. Between 1 November 2020 and 1 November 2021, exporting countries sent almost 4,200 pre-export notifications through the PEN Online system for planned shipments of ephedrine and pseudoephedrine, in bulk and in the form of pharmaceutical preparations. The notifications were for a total of more than 906 tons of pseudoephedrine and almost 57 tons of ephedrine. The shipments originated in 44 exporting countries and territories and were destined for 167 importing countries and territories. Overall, the level of trade in both ephedrine and pseudoephedrine was about 30 per cent lower than the average of the past three reporting years.

91. Table 3 below presents the 10 countries with the largest volume of imports of ephedrine and pseudoephedrine, ranked in terms of the volume notified through the PEN Online system, in the reporting period.

Table 3. The 10 countries with the largest imports of ephedrine and pseudoephedrine, by volume, 1 November 2020–1 November 2021

Ranking	*Ephedrine*	*Pseudoephedrine*
1	Nigeria	United States
2	Singapore	Egypt
3	Indonesia	Switzerland
4	Ghana	Belgium
5	Republic of Korea	Pakistan
6	United States	France
7	France	Indonesia
8	Uganda	Saudi Arabia
9	Canada	Singapore
10	Egypt	Japan

92. In 2020, China reported a stopped shipment of 8 tons of pseudoephedrine destined for Switzerland. Furthermore, the Board was made aware of a proposed shipment of 500 kg of ephedrine hydrochloride from India to Mozambique. The importer in this case was a first-time importer. During inquiries initiated by the Board, the Government of Mozambique informed the Board that the importing company had no authorization to import the ephedrine in question and that earlier, in 2019, the import certificate submitted by the company had been found to be fake. The proposed shipment was accordingly stopped.

93. In a similar incident, a quantity of 500 kg of ephedrine was intended to be exported from a known manufacturer and exporter in India to a first-time importer in Ghana, in August 2020. The shipment was objected to by Ghana and subsequent investigations in that country revealed that the import permit had been forged. The shipment was stopped by India. Further investigations are ongoing.

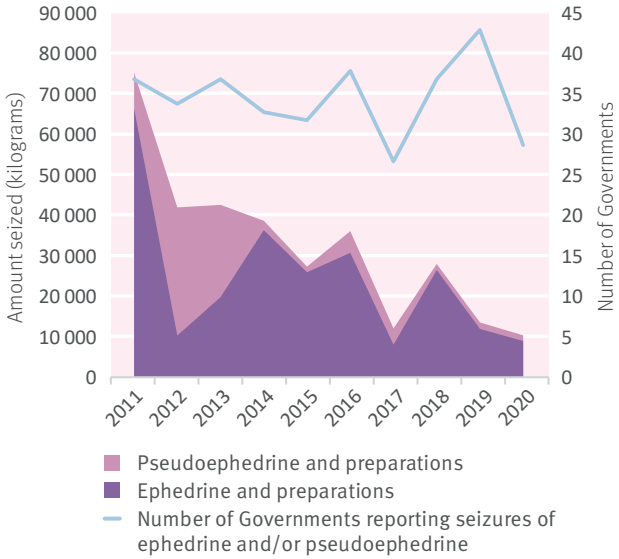
94. The incidents described above indicate that there continues to be a likelihood of diversion attempts from legitimate international trade in precursors. **The Board would like to remind Governments to continue to remain vigilant about such attempts. The Board also commends the efforts of the Governments of Ghana, India and Mozambique to conduct due diligence with**

regard to new importers of large quantities of ephedrine, thereby preventing possible trafficking attempts.

Trafficking

95. On form D for 2020, seizures of about 8.9 tons of ephedrine by 28 countries and about 1.4 tons of pseudoephedrine by 22 countries and territories were reported to INCB from all regions (see figure IV). China alone accounted for seizures of 7.3 tons of ephedrine, followed distantly by Myanmar (630 kg) and India (585 kg) in order of quantities seized. This follows seizures of 8.6 tons of ephedrine by China in 2019. The total of 10.3 tons of ephedrine and pseudoephedrine seized continued the declining trend of seizures of the substances observed in the past and falls significantly short of explaining the amount of methamphetamine seized in those regions where ephedrines-based manufacturing methods are known to prevail, as evidenced by forensic analysis. In the past decade, the number of countries reporting seizures of ephedrines has ranged from 26 in 2017 to 42 in 2019, with the total amount seized globally showing a fluctuating trend. Totalling 10.3 tons, seizures in 2020 were the lowest in the last 10 years. The marked decline in the amount of ephedrines seized coincides with the emergence of the use of alternative precursors for the manufacture of amphetamine and methamphetamine (see subsect. 1 *(d)* below).

Figure IV. Seizures of ephedrine and pseudoephedrine, as reported by Governments on form D, 2011–2020



Oceania

96. Australia and New Zealand are the only countries in the Oceania region that have reported seizures of ephedrines in the last 10 years. Of the total quantity of 21 tons seized in that period, Australia reported seizures of 16 tons, accounting for over 75 per cent of the total. In 2020, the largest amount of ephedrines seized was reported in Australia, totalling about 650 kg. However, this quantity represents one of the lowest reported by the country in the last 10 years, with the highest being over 6 tons in 2017. Thus, while the overall trend in quantities of ephedrines seized has been declining in Australia, for the first time in the last five years, the country reported seizures of 180 kg of ephedrine preparations and 475 kg of pseudoephedrine preparations. The ephedrine preparations were predominantly sourced from China and the pseudoephedrine preparations from India. The seizure by Australia of 475 kg of pseudoephedrine represents a major share of the global quantity of 1.4 tons seized in 2020, over half of which was sourced from India. In addition, in 2021, Australia communicated through PICS a seizure of 50 kg of pseudoephedrine, which was also sourced from India, indicating a trend of trafficking in pseudoephedrine from India to Australia, mostly on postal, courier and air freight routes.

97. On form D for 2020, New Zealand reported seizures of about 130 kg of ephedrine raw material, which was significantly less than the amount seized in 2019 (340 kg). The origin of the amounts seized was not known. Seizures of ephedrine have declined progressively in New Zealand for the last five years, to just over 10 per cent of the 1.2 tons seized in 2016. In September 2021, Belgium communicated through PICS an incident involving 3.5 kg of pseudoephedrine originating from the Democratic Republic of the Congo and destined for New Zealand in an air shipment concealed in spools of fishing line declared as accessories, indicating a possible new source of the substance for use in New Zealand.

East and South-East Asia

98. East and South-East Asia accounted for more than 80 per cent of global seizures of ephedrines in 2020. On form D for 2020, a total of 8.3 tons of ephedrine and pseudoephedrine were seized in the region, in China, including Hong Kong, and Myanmar; China alone accounted for 7.6 tons of the total and Myanmar for 632 kg. Of the approximately 100 tons of ephedrines seized globally in the last five years, China alone accounted for 47 tons. Nevertheless, the trend in China continued to decline after peaking at nearly 26 tons seized in 2016. Given that the illicit manufacture of methamphetamine in East and South-East Asia is believed to be predominantly ephedrines-based, the amount of ephedrines seized in the region does not completely correspond to the large quantity of methamphetamine seized, a trend previously reported by the Board. However, China also reported seizures of internationally non-scheduled chemicals in

sizeable quantities, which indicates the use of such chemicals in illicit ephedrine manufacture (see para. 136 below).

99. Myanmar reported two seizures of ephedrine totalling 630 kg on form D for 2020. In both cases, the country of origin was reported as China. This represents the largest quantity of ephedrine seized in Myanmar in the last 10 years. Malaysia, which had reported significant seizures of ephedrines over the last five years, did not report any such seizures in 2020. However, seizures from illicit laboratories of small quantities of red phosphorous and sodium hydroxide (caustic soda) were reported by Malaysia. The country has also, in the past, reported seizures of such internationally non-scheduled substances from illicit laboratories involved in the manufacture of methamphetamine.

100. After reporting seizures of large quantities of pseudoephedrine in 2017 (1.1 tons) and 2016 (3.8 tons), Thailand did not report any seizures of ephedrines or any other internationally scheduled or non-scheduled precursor chemicals in 2020. Nevertheless, Thailand is one of the three countries, along with the United States and Mexico, that together account for about half of the global quantities seized of the three main amphetamine-type stimulants.[16] It is evident that there is still insufficient information relating to trafficking in ephedrines originating from the East and South-East Asian region, one of the global hotspots for the illicit manufacture of amphetamine-type stimulants. **The Board urges the countries of the region to analyse the pattern of illicit manufacture of amphetamine-type stimulants in order to better understand and therefore better control any possible diversion of precursors and illicit drug manufacture.**

West Asia

101. In West Asia, the only seizures of ephedrines, albeit in minor quantities, were reported by Turkey and Kazakhstan. Turkey reported nine cases, totalling 7.3 kg of ephedrine, and Kazakhstan reported a single case involving 0.1 kg of the substance.

102. The only other countries in the region having reported any seizures of ephedrines in the last five years are Afghanistan and Pakistan. Afghanistan reported seizures of pseudoephedrine totalling 440 kg in 2019, having reported smaller quantities in previous years. The absence of seizures of ephedrine in Afghanistan in 2020 may indicate an increase in the use of the *Ephedra* plant, which grows wild in the country, for the illicit manufacture of methamphetamine. The Board has noted this development with concern since 2018. While no seizures of the *Ephedra* plant were reported by Afghanistan on form D for 2020, the continued seizures of methamphetamine sourced from Afghanistan suggests that the use of the *Ephedra* plant for illicit methamphetamine manufacture in that country could be of considerable scale. At the same time, forensic analysis of methamphetamine tablets seized, and presumed to have been manufactured, in Afghanistan, suggests that pharmaceutical preparations continued to be used as starting materials for illicit methamphetamine manufacture in that country.

South Asia

103. In 2020, India was once again the only country in the South Asian region to report seizures of ephedrines, continuing the trend from previous years. Seven cases involving a total of 585 kg of ephedrine and 13 cases involving a total of 255 kg of pseudoephedrine were reported. The origin of the substances in all of the cases was India itself. Apart from one seizure of over 480 kg of illicitly manufactured ephedrine from the premises of a factory in western India, most of the remaining seizures were effected when attempts were made to ship the substances on postal, courier or air cargo routes, using various concealment methods. Australia was reported as the destination in 11 cases and Malaysia and South Africa in one case each. Additional cases communicated through PICS confirm this trend of trafficking in ephedrine and pseudoephedrine from India to Australia. In one case, 25 kg of pseudoephedrine concealed in kitchen items were interdicted from an air freight shipment destined for Australia in February 2021. Furthermore, Australia communicated a seizure of 50 kg of pseudoephedrine transported by air from a source in India in June 2021. From media reports, the Board is aware of the dismantling in August 2021 of an illicit laboratory involved in the manufacture of ephedrine in Gujarat in western India.

104. The Board appreciates the efforts of the Governments of Australia and India to interdict consignments transported on the postal, courier and air cargo routes, which often involve novel concealment methods. At the same time, the **Board encourages the Government of India to investigate whether the seized substances have been illicitly manufactured or diverted from domestic distribution channels. In either case, closer monitoring of the domestic distribution channels for such chemicals and voluntary cooperation measures with the chemical industries concerned are likely to be effective in curbing such attempts at illicit manufacturing and trafficking.**

Africa

105. Only two countries in the African region, Botswana and Nigeria, reported seizures of ephedrine on form D for

[16] World Drug Report 2021, booklet 4, *Drug Market Trends: Cocaine, Amphetamine-type Stimulants* (United Nations publication, 2021).

2020. However, the Government of Burundi informed the Board separately of a seizure of 2 tons of ephedrine in its territory in 2021. In 2020, Botswana seized a small quantity of less than 50 grams of ephedrine that originated in South Africa. In the same year, Nigeria seized 19 kg of ephedrine in two cases. In one case, 16 kg of ephedrine concealed in a microphone was intercepted during an attempt to smuggle it to the Democratic Republic of the Congo by air. In the other case, 3 kg of the substance was discovered during routine checks of the cargo area of an airport, concealed in cans of tinned tomatoes destined for South Africa. The Democratic Republic of the Congo was also identified as the source country in a case involving a seizure of 3.5 kg of pseudoephedrine destined for New Zealand in September 2021 (see also para. 97).

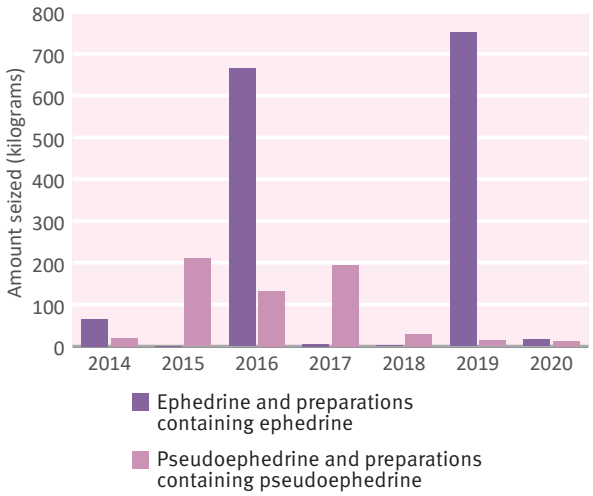
106. Together, these seizures represent the smallest amount of ephedrine seized in Africa in the last five years by a substantial degree, as the seizures in previous years involved quantities totalling hundreds of kilograms. However, large quantities of ephedrine and pseudoephedrine were imported into the region for licit purposes, with Nigeria reporting licit requirements of more than 10 tons of ephedrine and more than 23 tons of pseudoephedrine (see table 3 above). Imports of similar quantities were pre-notified to Nigeria through the PEN online system in 2020. In the past, the Board has reported the dismantling of illicit methamphetamine laboratories in Nigeria that had used ephedrines-based methods and had apparently been supplied by imported shipments that had been subsequently diverted. **The Board encourages the Governments in the region to review their legitimate requirements for precursors of amphetamine-type stimulants and to provide complete information to the Board in respect of seizures of substances in Table I and Table II of the 1988 Convention.**

Americas

107. The situation in North America is characterized by sporadic seizures of large quantities of ephedrines in certain years, interspersed with negligible seizures in others. After reaching a six-year high in 2019, the volume of ephedrines seized in North America returned to negligible levels in 2020 (see figure V). Of the countries in South America, only Argentina reported seizures of ephedrines on form D for 2020 (less than 1 kg). No seizures of ephedrines were reported by any country in Central America and the Caribbean.

108. Canada reported the seizure of only 14 kg of ephedrine in 2020, after reporting seizures of 750 kg of the substance and some 28,000 pseudoephedrine tablets in 2019. The Board is also aware of a further seizure of 100 kg of ephedrine tablets in May 2020 in Canada, the result of a year-long operation during which multiple drug seizures and arrests were made. All chemicals seized during the operation are believed to have been obtained through domestic diversion. The ephedrine had been extracted from domestically-sourced legitimate pharmaceutical preparations.

Figure V. Seizures of ephedrine and pseudoephedrine, as reported by Governments in North America, 2014–2020



109. In Mexico and the United States, the trend of negligible seizures of ephedrines observed in past years continued, reflecting that the illicit market in North America has been predominantly supplied by methamphetamine manufactured in large-scale laboratories using P-2-P-based methods.

110. However, United States authorities believe that individuals and organized groups have continued to engage, although to a lesser degree, in activities to obtain pseudoephedrine and ephedrine products for local manufacture in amounts that exceed the limits established under the country's Combat Methamphetamine Epidemic Act of 2005 (a daily sales limit of 3.6 grams and a cumulative purchase limit of 9 grams within a 30-day period) by visiting multiple retail establishments to buy the products, an activity referred to as "smurfing". In addition, traffickers have been relying on crude manufacturing methods such as the "one pot method", requiring smaller amounts of pseudoephedrine tablets, which, after being collected, are combined with other household products that are easily obtainable. According to the United States authorities, illicit methamphetamine laboratories that were supplied with ephedrine and pseudoephedrine, as well as essential chemicals, from legitimate domestic markets were implicated in nearly 75 per cent of the 656 total incidents involving illicit laboratories in that country.

Europe

111. A total of 14 European countries reported seizures of ephedrines in 2020, a sharp decline from the number that had reported such seizures in previous years (19 countries in 2019, 20 in 2018, 16 in 2017 and 21 in 2016). Poland accounted for the largest total quantity seized in Europe. Ukraine seized 76 kg of pseudoephedrine preparations, with Egypt, Israel, the Republic of Moldova and Ukraine itself being the most frequently identified sources of the preparations; one seizure of 22 kg of ephedrine preparations had been domestically sourced. Bulgaria, Czechia and Hungary each reported seizures of ephedrines in excess of 20 kg, after having reported no seizures of the substances in 2019. The remaining countries in Europe reported seizures of very small amounts.

112. The amount and type of ephedrines seized in Europe and the declining number of countries reporting seizures of these substances indicates a decisive trend in which their use is limited to small laboratories using only preparations of ephedrine and pseudoephedrine, as opposed to larger laboratories, which rely increasingly on MAPA or non-scheduled chemicals (see subsect. *(d)* below).

(b) Norephedrine and ephedra

Licit trade

113. Between 1 November 2020 and 1 November 2021, 15 exporting countries pre-notified, through the PEN Online system, 194 shipments of norephedrine to 37 importing countries, involving a total of more than 25 tons of raw material and more than 4 tons in the form of pharmaceutical preparations. Shipments amounting to 1 ton or more were pre-notified to the following importing countries, in descending order of the amounts shipped: United States, Denmark, Indonesia, Japan, Myanmar and Philippines. Overall, international trade in norephedrine, a substance that can be used in the illicit manufacture of amphetamine, remained at a low level compared with trade in other precursors of amphetamine-type stimulants.

Trafficking

114. Global seizures of norephedrine, as reported on form D for 2020, were limited to 4 kg and five countries, namely, Australia, Canada, Turkey, Ukraine and the United States, with the latter country alone accounting for 3.5 kg of the total quantity seized. Apart from seizures of nearly 250 kg of the substance in Australia and about 20 kg in the United Kingdom in 2017, total global seizures of norephedrine have amounted to less than 15 kg in the last five years.

115. China is the only country in the world to have reported seizures of the *Ephedra* plant on form D since 2011. The country reported seizures of the *Ephedra* plant in the amount of 100,765 kg in 2019 and 108,363 kg in 2020. Unfortunately, no further details of the seizures were provided on form D.

(c) P-2-P, phenylacetic acid, APAAN, APAA and MAPA

116. With the scheduling of MAPA, effective 3 November 2020, three alternative precursors of P-2-P and, subsequently, of amphetamine and methamphetamine, have been placed under international control since 2014. All three chemicals (APAAN, APAA and MAPA) are considered to be designer precursors that are traded in very limited quantities or not at all. By contrast, P-2-P and phenylacetic acid are traded legitimately, albeit to a different extent. Non-scheduled alternatives to P-2-P, pre-precursors and designer precursors that are used in the illicit manufacture of amphetamine and methamphetamine are discussed in subsection *(d)* below.

Licit trade

117. Between 1 November 2020 and 1 November 2021, proposed international trade in P-2-P and phenylacetic acid recorded in the PEN Online system was at a level similar to previous years. Sixteen proposed shipments of P-2-P, from three exporting countries to seven importing countries, and about 770 proposed shipments of phenylacetic acid, from 16 exporting countries to 51 importing countries and territories, were pre-notified through the PEN Online system.

118. By contrast, there have been only 7 pre-export notifications for APAAN since its international scheduling in 2014, no notifications for APAA since its scheduling in 2019 and one pre-export notification for MAPA since November 2020. All of the transactions notified through PEN Online involved small amounts for reference and laboratory purposes.

Trafficking

119. In 2020, seizures of **P-2-P** were reported by countries in all regions except Africa. The largest total amounts seized were reported by Mexico (more than 11,000 litres), followed by the Netherlands (more than 4,200 litres) and China (almost 2,800 litres). As in previous years, in most cases, the substance was seized from illicit laboratories or warehouses, indicating that it had been illicitly manufactured rather than having been diverted from a legitimate source. Seizures totalling more than 100 litres were also reported by Belgium, Jordan, Myanmar and Poland. **The Board would like to once more remind Governments of the importance of determining and reporting on whether P-2-P has been diverted from a legitimate**

source and if so, what that source was, or whether the P-2-P has been illicitly manufactured from other controlled precursors or from non-scheduled alternative precursors. Distinguishing the two scenarios – diversion from legitimate sources and illicit manufacture – will enable the authorities concerned, and the Board, to devise appropriate approaches to address the underlying weaknesses.

120. The largest amount of **phenylacetic acid** seized in 2020 was reported by Mexico. However, at about 570 kg, the total amount reported seized was just above 15 per cent of the amount reported in 2019. Seizures occurred in illicit laboratories where the substance was presumably manufactured illicitly from pre-precursors such as benzyl cyanide (see para. 131 below) and subsequently used for the illicit synthesis of P-2-P and methamphetamine. This matches the situation in previous years. Seizures reported by other countries were negligible.

121. On form D for 2020, only countries in Europe reported seizures of **APAA**. As in previous years, the largest amounts seized were reported by the Netherlands (totalling more than 1.2 tons) and Belgium (about 220 kg). However, the total quantity seized amounted to only about 30 per cent of the total in previous years, supporting the observation that seizures of designer precursors tend to decline rapidly after their international scheduling. Quantities of **APAAN** reported seized on form D for 2020 totalled less than 25 kg.

122. Nine countries reported seizures of **MAPA** on form D, totalling more than 32.5 tons. The largest amounts seized were reported by Belgium (10.8 tons), followed by Germany (7.6 tons), Hungary (7.3 tons) and the Netherlands (almost 5 tons). More than 875 kg of MAPA were reported seized by Australia, the first such seizures of the substance in Oceania and indeed outside Europe. China, including Hong Kong, was the reported country of origin, when the origin could be traced. However, India and the Netherlands were also identified as the countries of origin for some shipments of up to 45 kg. Taken together, the more complex routing of shipments of MAPA within Europe and the emergence of seizures of the substance in previously unaffected regions reflects an adaptation of illicit market dynamics in response to the international scheduling of the substance in 2020.

123. In 2021, through PICS, the Netherlands communicated incidents involving a total of almost 3,800 litres of P-2-P; most of the incidents occurred in illicit laboratories. In cases where such information was available, traces of MAPA or P-2-P methyl glycidic acid derivatives found in the laboratories suggested the illicit manufacture of P-2-P from those starting materials. By contrast, only one incident involving APAA (50 kg) was communicated through PICS and no additional incidents involving APAAN were communicated through the system in 2021.

124. Incidents involving MAPA totalled more than 11 tons in 2021, of which about 4.4 tons were seized in illicit laboratories and warehouses, 5 tons at airports and about 1.5 tons on an inland road or highway. All of the MAPA seized at borders had been misdeclared, most frequently as "microcrystalline cellulose". All of the incidents recorded in PICS were communicated by European countries; where such information was available, the country of origin was identified as China, including Hong Kong. A seizure at Istanbul Airport of a shipment of 4.3 tons of MAPA, which was to be smuggled by land to the Netherlands, is another indication that trafficking routes are becoming more complex as controls tighten. An illustration of incidents involving selected designer precursors of P-2-P communicated through PICS is provided in figure I above.

(d) Use of non-scheduled chemicals and other trends in the illicit manufacture of amphetamine and methamphetamine

125. The majority of the non-scheduled chemicals that have emerged in recent years in connection with the illicit manufacture of amphetamine and methamphetamine are closely related in chemical structure to chemicals in Tables I and II of the 1988 Convention and can be converted into the related controlled chemical by readily applicable means. Chemically, they include common derivatives, including reversibly formed derivatives and stable intermediates. Since these precursors are often purpose-made and designed to circumvent existing controls, they may also disappear quickly after being placed under control (see para. 30 above). In addition, countries continue to report a number of common chemicals that are available off the shelf and that have long been included in the limited international special surveillance list of non-scheduled substances and other regional or national watch lists as substitutes for controlled precursors (see paras. 129–137 below).

Derivatives of P-2-P methyl glycidic acid and *alpha*-phenylacetoacetic acid

126. On form D for 2020, seven countries reported seizures of non-scheduled designer precursors of amphetamine and methamphetamine; all of them were reported by countries in Europe. The largest amounts in 2020 involved **P-2-P methyl glycidic acid derivatives,** of which Belgium seized 695 litres and the Netherlands about 540 kg. Germany and the Netherlands also reported seizures of

EAPA, the ethyl ester analogue of MAPA. While not under international control, P-2-P methyl glycidic acid was placed under regional control in the European Union in November 2020.

127. In the first 10 months of 2021, seven incidents involving P-2-P methyl glycidic acid derivatives were communicated through PICS, amounting to almost 195 kg. All of the incidents were communicated by the Netherlands; none of them involved a border seizure.

128. In addition, laboratory impurity analysis provided further forensic evidence of the use of P-2-P methyl glycidate as an alternative precursor for the illicit manufacture of amphetamine for "captagon" tablets seized in Lebanon. Both APAAN and P-2-P methyl glycidate have thus now been found to be associated with "captagon" seized in Jordan, Lebanon and the United Arab Emirates. **The Board encourages the countries with the capacity to conduct forensic profiling analyses to invest in such in-depth analyses, with a view to identifying the precursors used in illicit drug manufacture.**

Benzaldehyde, nitroethane and 1-phenyl-2-nitropropene

129. **Benzaldehyde** and **nitroethane** are indicative of the so-called nitrostyrene method for the manufacture of P-2-P and, subsequently, methamphetamine or amphetamine. On form D for 2020, seizures of one or both of these chemicals were reported by seven countries. After two years without any such seizures, significant amounts of benzaldehyde, totalling 1,150 litres, were reported seized in Mexico. This was the largest amount of the substance seized in 2020 worldwide. The second largest amount of benzaldehyde seized (about 385 kg) was reported by Estonia, followed by Argentina (100 litres); a number of countries in Europe reported amounts indicative of small-scale user-based manufacture.

130. **1-Phenyl-2-nitropropene** is the chemical intermediate derived from the reaction between benzaldehyde and nitroethane and may also be encountered as a starting material in illicit laboratories. On form D for 2020, seizures of small quantities of the substance were reported by a few countries in Europe.

Benzyl chloride, sodium cyanide and benzyl cyanide

131. On form D for 2020, five countries reported seizures of benzyl chloride, sodium cyanide and/or benzyl cyanide. **Benzyl cyanide** is the chemical intermediate derived from the reaction between **benzyl chloride** and **sodium cyanide** and may also be encountered as a starting material in illicit laboratories. The reaction may then proceed by way of APAAN or phenylacetic acid to P-2-P and, subsequently, methamphetamine or amphetamine.

132. In 2020, Mexico was the only country to report notable seizures of benzyl chloride (almost 10,800 litres). In addition, more than 3,300 litres of benzyl cyanide were reported seized in that country. Seizures of benzyl cyanide were also reported by Jordan and the Netherlands (more than 200 litres each). Seizures of P-2-P, phenylacetic acid and/or APAAN in these countries are indicative of their illicit manufacture rather than their diversion from legitimate sources. This likely applies to seizures of more than 11,000 litres of P-2-P in Mexico, more than 4,200 litres in the Netherlands and 120 litres in Jordan in 2020 (see also para. 119 above).

133. **Sodium cyanide** is the chemical that is reacted with benzyl chloride to produce benzyl cyanide, which can be further converted into P-2-P by way of APAAN or phenylacetic acid. On form D for 2020, record seizures of sodium cyanide, amounting to almost 108 tons, were reported by Myanmar, compared with the 4.6 tons reported seized by the country in 2019. Mexico reported seizures totalling slightly more than 5 tons in 2020.

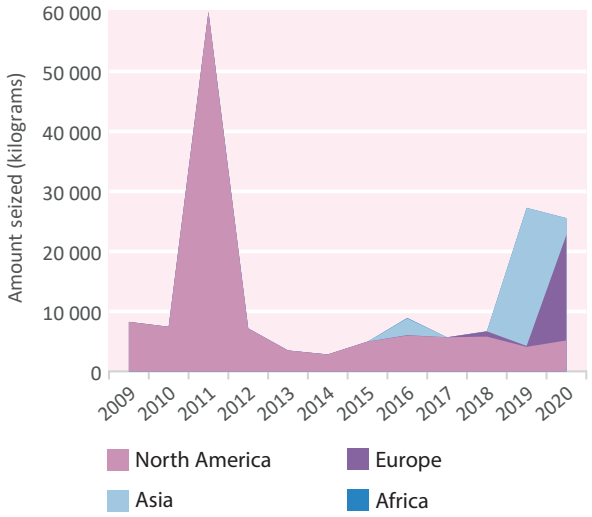
Other chemicals not under international control that were seized in relation to the clandestine manufacture of amphetamine or methamphetamine[17]

134. Seizures of **tartaric acid**, a separation agent that is used to increase the potency of methamphetamine manufactured using P-2-P-based methods, have been reported by Mexico regularly since 2009, coinciding with that country's ban on imports of ephedrine and the subsequent shift to the use of P-2-P-based methods in the illicit manufacture of methamphetamine in the country. As a result of the increase in illicit methamphetamine manufacture in Europe and a partial shift to P-2-P-based methods in East and South-East Asia, notable seizures of tartaric acid started being reported by countries in those regions as well (see figure VI). Small amounts of tartaric acid were also reported by Nigeria in 2016, in connection with the first industrial-scale illicit methamphetamine laboratory in that country.[18]

[17] See also paras. 145–146 on methylamine below.

[18] INCB report on precursors for 2016 (E/INCB/2016/4), para. 101.

Figure VI. Seizures of tartaric acid, as reported by Governments in selected regions on form D, 2009–2020



135. In its report for 2020, INCB noted the use in illicit laboratories in the Netherlands of a modified and significantly more efficient method for manufacturing methamphetamine, which involves, in addition to tartaric acid, two chemicals, known as **AIBN** (azobisisobutyronitrile) and **methyl thioglycolate**. Both chemicals are used along with other chemicals usually associated with P-2-P-based manufacturing methods. Their use in such methods increases the output of more potent methamphetamine.[19] On form D for 2020, the Netherlands reported seizures of more than 325 kg of AIBN and 525 kg of methyl thioglycolate.

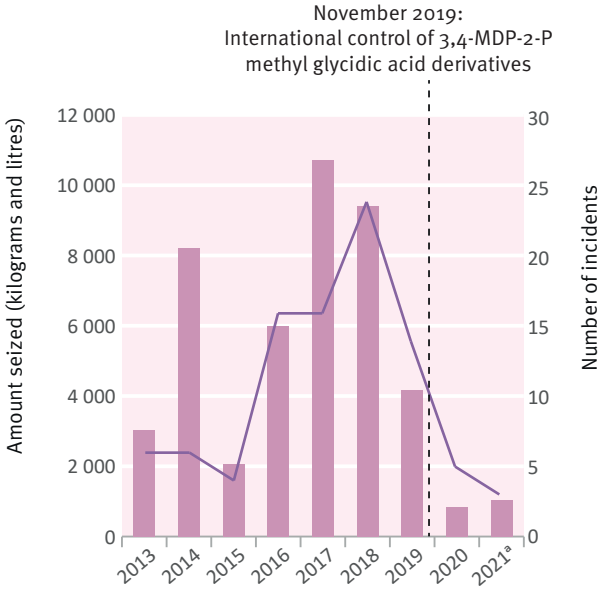
136. Notwithstanding signs of a partial shift to P-2-P-based methods in East and South-East Asia, ephedrines-based methods continue to be the predominant methods of illicit methamphetamine manufacture in that region. However, there has also been diversification towards the use of alternative precursors in the region, including for the illicit manufacture of ephedrine. On form D for 2020, China reported the seizure of significant amounts of chemicals indicative of such illicit manufacture of ephedrine or pseudoephedrine. Among the chemicals reported were almost 110 tons of **propiophenone**, 1.4 tons of **bromine** and 6.4 tons of **2-bromopropiophenone**. In addition, China seized more than 700 kg of **chloroephedrine**, an intermediate product in the manufacture of methamphetamine from ephedrine or pseudoephedrine using the so-called Emde method, which has been the predominant method for the illicit manufacture of methamphetamine in East and South-East Asia.

137. By contrast, the so-called Nagai method is the predominant ephedrines-based method for the illicit manufacture of methamphetamine in other parts of the world, including Europe, Oceania and West Asia. Chemicals associated with this manufacturing method include **iodine, hydriodic acid, red phosphorous, hypophosphorous acid** and **phosphorous acid**. On form D for 2020, Canada, Indonesia, Malaysia, New Zealand and the United States, as well as a number of countries in Europe, reported seizures of one or more of these chemicals, usually indicative of smaller-scale manufacturing operations.

2. Substances used in the illicit manufacture of MDMA and its analogues

138. As regards the extent of the use of the various precursors of MDMA for illicit purposes, there continues to be little evidence of 3,4-MDP-2-P, piperonal, safrole or isosafrole being used as starting materials in illicit manufacture. While seizures of the recently scheduled substances 3,4-MDP-2-P methyl glycidate and 3,4-MDP-2-P methyl glycidic acid appear to have levelled off (see figure VII), the range of non-scheduled alternatives has further evolved. In terms of licit trade, piperonal remains the most widely traded precursor among the six precursors of MDMA under international control.

Figure VII. Incidents involving 3,4-MDP-2-P methyl glycidic acid derivatives communicated through PICS, 2013–2021



[a] Data only cover the first 10 months of 2021.

[19] INCB report on precursors for 2020 (E/INCB/2020/4), figure IX.

(a) 3,4-MDP-2-P, 3,4-MDP-2-P methyl glycidate, 3,4-MDP-2-P methyl glycidic acid and piperonal

Licit trade

139. Between 1 November 2020 and 1 November 2021, 17 exporting countries and territories notified the authorities of 51 importing countries and territories of approximately 860 proposed exports of piperonal. The number of both exporting countries and importing countries in that period remained about the same as in previous years. There was only one proposed shipment of 3,4-MDP-2-P, involving a very small quantity. No trade in the two designer precursors of MDMA – 3,4-MDP-2-P methyl glycidate and 3,4-MDP-2-P methyl glycidic acid – was reported.

Trafficking

140. On form D for 2020, the Governments of 15 countries and territories reported seizures of 3,4-MDP-2-P, 3,4-MDP-2-P methyl glycidate, 3,4-MDP-2-P methyl glycidic acid and/or piperonal. The only countries that reported notable seizures of **3,4-MDP-2-P** were Belgium (310 litres) and the Netherlands (about 330 litres). As in the past, it is assumed that the amounts seized had typically been manufactured illicitly. Similar to previous years, the largest seizures of **3,4-MDP-2-P methyl glycidic acid derivatives** were reported by the Netherlands, totalling more than 950 kg of 3,4-MDP-2-P methyl glycidic acid and almost 480 litres of 3,4-MDP-2-P methyl glycidate. For the first time, Hong Kong, China, reported a seizure of 3,4-MDP-2-P methyl glycidate, in the amount of 40 kg, en route from China to Australia. Another 5 kg of the substance were seized in Australia, and about 7 kg were seized in Ukraine. With the exception of Africa, seizures of derivatives of 3,4-MDP-2-P methyl glycidic acid have now been reported in all regions. However, the amounts seized have fluctuated considerably from year to year, often reflecting a limited number of significant seizures. As in previous years, seizures of **piperonal** in 2020 remained negligible.

141. Incidents involving the above-mentioned chemicals, with the exception of piperonal, continued to be reported in 2021. Through PICS, INCB is aware of seizures totalling more than 1 ton of 3,4-MDP-2-P methyl glycidic acid derivatives in the first 10 months of 2021. In addition, incidents involving the use of almost 900 litres of 3,4-MDP-2-P in illicit laboratories were communicated through PICS. All of those incidents occurred in the Netherlands.

(b) Safrole, safrole-rich oils and isosafrole

Licit trade

142. Between 1 November 2020 and 1 November 2021, five exporting countries sent 31 pre-export notifications regarding safrole to the authorities of 12 importing countries and territories through the PEN Online system. The notifications concerned a total volume of approximately 1,000 litres, which was about one third less than the previous year. There were only a few pre-export notifications for safrole-rich oils, involving negligible amounts, and none for isosafrole, during that period.

Trafficking

143. On form D for 2020, as in previous years, very few Governments reported seizures of safrole and safrole-rich oils. The largest amount was reported by Afghanistan (400 litres, in six incidents). However, no further details were provided, and despite analogies with illicit methamphetamine manufacture in terms of manufacturing methods, the use of safrole for the illicit manufacture of MDMA in Afghanistan remains speculative. The second largest total quantity of safrole seized in 2020 – amounting to only about 14 litres – was reported by the Netherlands. Turkey reported seizures of isosafrole in negligible amounts, the first reported seizures of the substance worldwide since 2016.

(c) Use of non-scheduled substances and other trends in the illicit manufacture of MDMA and its analogues

144. While the effects of the international scheduling of 3,4-MDP-2-P methyl glycidate and 3,4-MDP-2-P methyl glycidic acid in November 2019 have yet to be fully evident in seizure statistics, traffickers appear to have started to show an interest in an alternative precursor, **MAMDPA**, the "ecstasy"-type analogue of MAPA, of which nearly 340 kg were seized in the Netherlands, having allegedly originated in Hong Kong, China. The emergence of MAMDPA provides further evidence supporting the Board's call to address groups of substances that are closely related chemically.

3. Other trends in the illicit manufacture of amphetamine-type stimulants

Methylamine

145. Methylamine is a versatile chemical that is required in the illicit manufacture of a number of amphetamine-type stimulants (e.g., methamphetamine and MDMA) and

new psychoactive substances, namely, synthetic cathinones, as well as ephedrine.

146. On form D for 2020, the largest quantity of methylamine seized was reported by Mexico (more than 11,000 litres of methylamine and almost 70,000 kg of methylamine hydrochloride), followed by the Netherlands (more than 17,000 litres) and Belgium (more than 4.1 tons). During the first 10 months of 2021, seizures totalling more than 11,500 litres were communicated through PICS. All of the seizures occurred in the Netherlands. Seized in illicit laboratories, the substance was often found in an alcoholic mixture. In addition, in 2021, Austria dismantled an illicit laboratory and seized 125 kg of methylamine.

Hydrogen gas

147. Hydrogen gas can be used as a reducing agent in the illicit manufacture of several synthetic drugs. On form D for 2020, Germany reported 14 thefts of hydrogen gas, totalling more than 15,500 litres. These occurrences confirm a trend that started in 2015, with amounts fluctuating from year to year and several companies having been targeted repeatedly despite the tightening of their security measures. Authorities in Germany estimated that the amount stolen in 2020 could potentially have been used in the illicit manufacture of more than 23 tons of MDMA. Many of the stolen gas cylinders were subsequently found, mainly in the Netherlands, but also in Belgium. In 2020, the two countries reported seizures of almost 5,500 litres and 70 litres of hydrogen gas, respectively. Thefts (in Germany) and seizures (in the Netherlands) of hydrogen gas also continued to be communicated through PICS in 2021. Amounts reported in the first 10 months of 2021 exceeded the amounts reported on form D for 2020.

Other chemicals not under international control

148. As in previous years, chemicals frequently mentioned on form D for 2020 included chemicals associated with the so-called Leuckart method of illicit manufacture, which can be used to manufacture amphetamine and methamphetamine from P-2-P, or to manufacture MDMA and related substances from 3,4-MDP-2-P. As in previous years, significant amounts of such chemicals were seized in illicit laboratories and warehouses in Europe, notably in the Netherlands (almost 29,000 litres of **formamide** and 19,000 litres of **formic acid**), Belgium (8,300 litres of formamide and 8,000 litres of formic acid), and Germany (more than 1,650 litres of formamide and almost 1,000 litres of formic acid). In addition, Afghanistan reported two seizures of formic acid totalling more than 5,800 litres, an indication of a possible evolution of the illicit manufacture of methamphetamine in that country. The substance allegedly originated in the Islamic Republic of Iran.

B. Substances used in the illicit manufacture of cocaine

1. Potassium permanganate

149. Potassium permanganate is the principal oxidizing agent used in the illicit manufacture of cocaine, and most of the cocaine that is seized continues to be highly oxidized.[20]

Licit trade

150. Between 1 November 2020 and 1 November 2021, the authorities of 33 exporting countries and territories sent approximately 1,900 pre-export notifications to 119 importing countries and territories relating to a total of more than 36,000 tons of potassium permanganate. The main exporter was China, accounting for 69 per cent of the total amount of pre-notified exports, followed by India and the United States, accounting for more than 18 per cent and 9 per cent, respectively.

151. Imports of the substance by the three coca-producing countries in South America – Bolivia (Plurinational State of), Colombia and Peru – continued to account for a very limited proportion (less than 1 per cent only) of the total global amount imported. Imports of the substance by other countries in South America amounted to 5 per cent (1,907 tons), representing another year-on-year increase in such imports. None of those countries exported or re-exported potassium permanganate in any significant amounts.

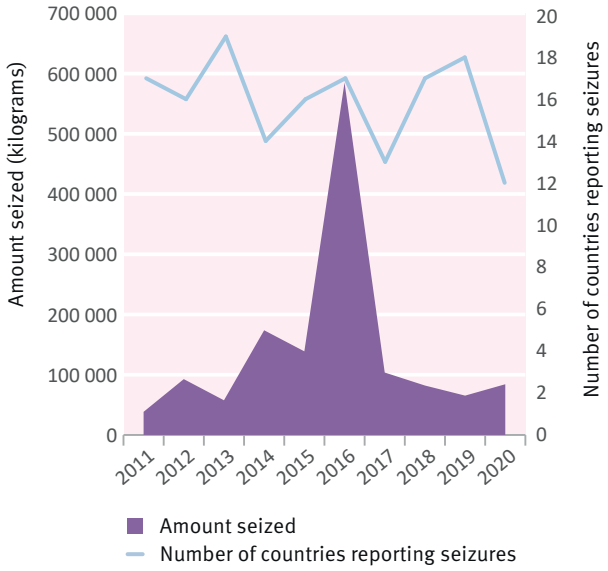
152. On form D for 2020, China reported having stopped 25 exports involving a total of more than 1,685 tons of potassium permanganate destined for 15 countries. India stopped the export of 5.1 tons of the substance to two destination countries. The shipments were stopped because the importing authorities objected through PEN Online. Most of the objections were for administrative reasons such as the absence or late submission of a valid import authorization.

Trafficking

153. For many years, global seizures of potassium permanganate have fluctuated around 95 tons (with an outlier in 2016) (see figure VIII) and have predominantly been reported by countries in South America and by China.

[20] According to results from the Cocaine Signature Program of the United States Drug Enforcement Administration Special Testing and Research Laboratory, only about 1 per cent of the cocaine samples examined, from seizures in 2020 in the United States, were moderately or not oxidized.

Figure VIII. Seizures of potassium permanganate, as reported by Governments on form D, 2011–2020



154. Among the countries in South America that have reported seizures of potassium permanganate, Colombia has accounted for the bulk of the quantities seized each year. In 2020, Colombia reported seizures totalling almost 65 tons. However, seizures of precursors of potassium permanganate in that country point to domestic illicit manufacture as a notable source of the seized potassium permanganate.

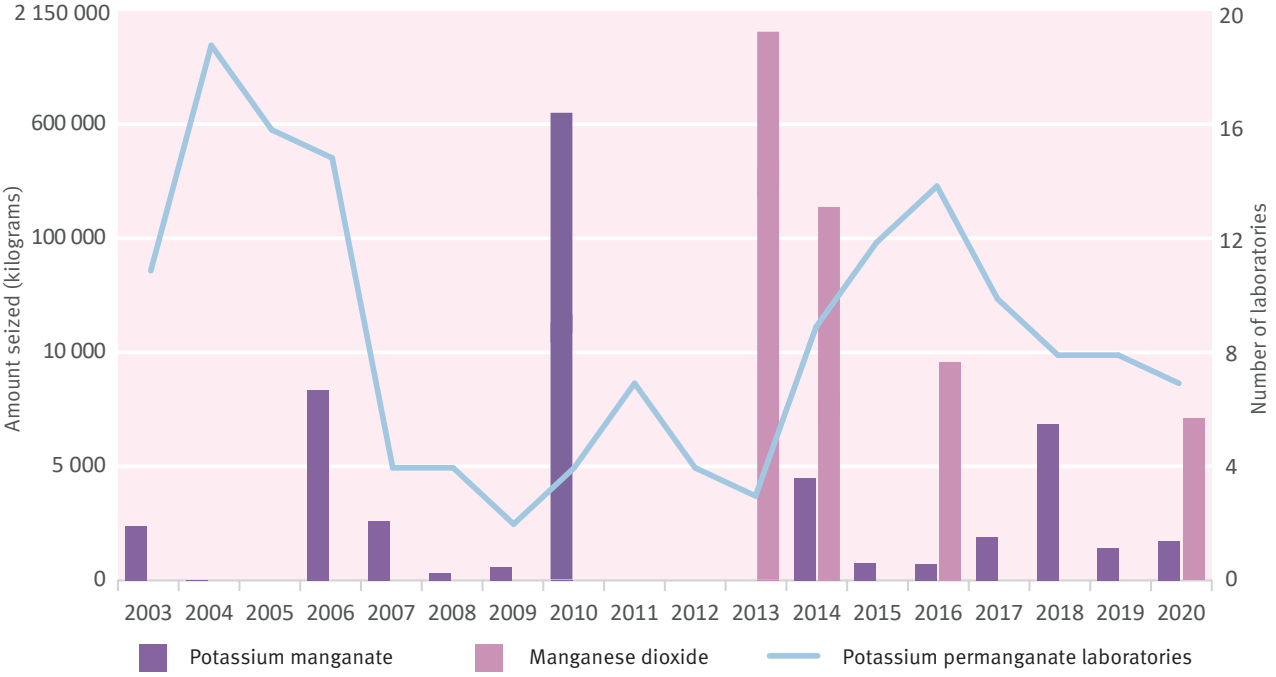
155. Seizures of potassium permanganate reported on form D for 2020 by Chile, Venezuela (Bolivarian Republic of) and Bolivia (Plurinational State of) (in descending order of amounts seized) were the largest after those reported by Colombia and together amounted to about 25 per cent of the total amount seized in Colombia.

2. Use of non-scheduled substances and other trends in the illicit manufacture of cocaine

156. Over the years, a variety of chemicals have been encountered in clandestine cocaine laboratories. These have included: *(a)* precursors of and substitutes for potassium permanganate; *(b)* chemicals that help to improve the efficiency of the manufacturing process, such as sodium metabisulfite and calcium chloride; *(c)* a variety of common acids, bases and solvents used in the extraction of cocaine base from coca leaves and for the conversion of cocaine base into hydrochloride; and *(d)* chemicals used to illicitly manufacture controlled precursors used in cocaine processing. Most of these chemicals are sourced domestically.

157. Seizures of **manganese dioxide** (pyrolusite) and **potassium manganate**, two pre-precursors of potassium permanganate, have been reported regularly by Colombia. On form D for 2020, Colombia reported seizures totalling 7.1 tons of manganese dioxide (three incidents) and 1.7 tons of potassium manganate (five incidents); the latter

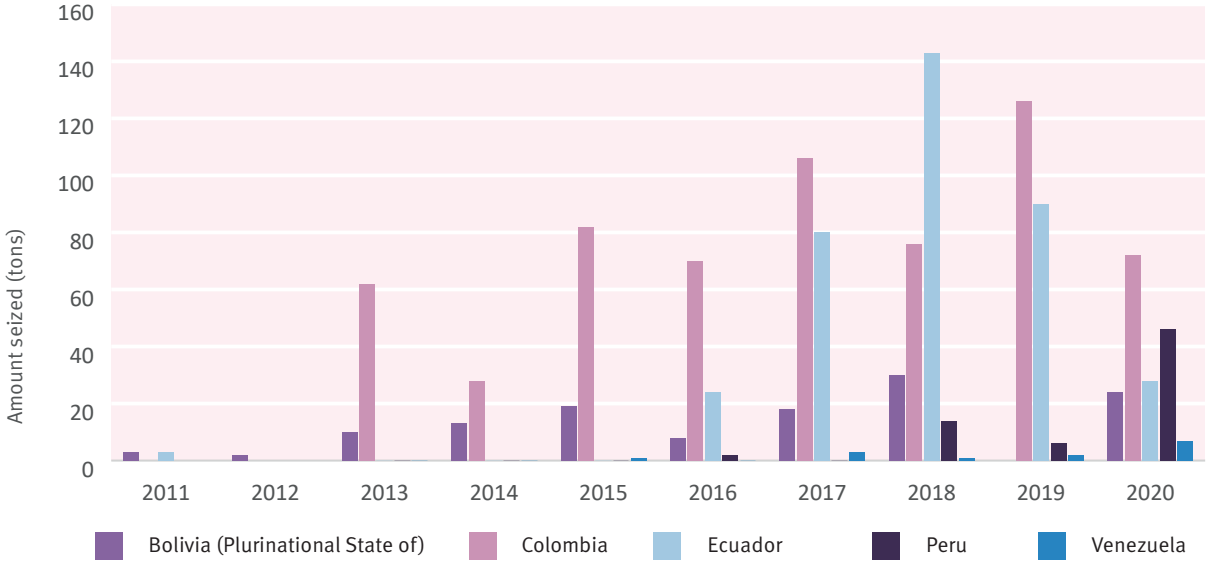
Figure IX. Seizures of potassium manganate and manganese dioxide reported by Colombia on form D, and potassium permanganate laboratories dismantled in Colombia, 2003–2020[a]



Source: INCB and the Colombian Drug Observatory

[a] To aid in visually representing the large amounts of chemicals seized in 2010, 2013 and 2014, the left vertical axis has been presented in non-linear increments.

Figure X. Seizures of calcium chloride, as reported by Governments in South America on form D, 2011–2020



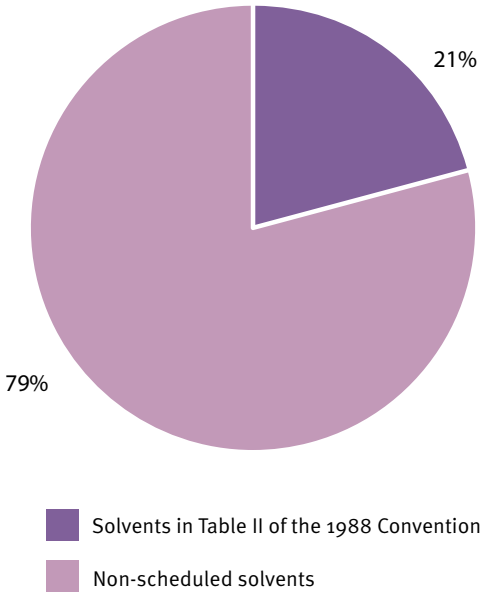
may have been manufactured illicitly, as it is an intermediate in the manufacture of potassium permanganate from manganese dioxide. Seizures of potassium (and sodium) manganate were also reported by the Netherlands in 2018 and 2019, however in substantially smaller quantities. Colombia has also regularly reported the dismantling of laboratories engaged in the illicit manufacture of potassium permanganate. In the first 10 months of 2021, six such laboratories were destroyed.[21]

158. Several countries, in particular in South America, regularly report on form D notable seizures of **sodium hypochlorite**, locally known as "*lejía*" ("bleach"), a possible complement used in the manufacture of potassium permanganate. During the period 2011–2020, the Plurinational State of Bolivia and Peru accounted for, respectively, 55 per cent and 41 per cent of the total amount of sodium hypochlorite reported seized. In 2020, Argentina reported the largest quantities of the substance seized.

159. Analysis of quantities of **sodium metabisulfite** reported seized on form D for 2020 confirmed the practice of standardizing the oxidation level of cocaine base sourced from multiple extraction laboratories prior to further processing. As in previous years, the largest amounts seized were reported by Bolivia (Plurinational State of), Colombia, Peru and Venezuela (Bolivarian Republic of). Similarly, as in previous years, seizures of small amounts of sodium metabisulfite were also reported by countries situated along cocaine trafficking routes, such as Ecuador, and by destination countries, such as the Netherlands, where cocaine was recovered from the materials into which it had been incorporated for the purpose of smuggling.

160. Since 2018, INCB has reported on increasing seizures of **calcium chloride**, a drying agent for solvents, in countries in South America.[22] The Board has also pointed to the difficulties associated with backtracking investigations conducted between alleged source, transit and destination countries. In 2020, following the placement of calcium

Figure XI. Proportion of seizures of solvents used for illicit cocaine processing, as reported by Governments in South America, 2016–2020



[21] Colombian Drug Observatory (www.odc.gov.co/sidco/oferta/infraestructura-sustancias-quimicas).

[22] INCB report on precursors for 2018 (E/INCB/4/2018), para. 170.

chloride under control in Peru in January of that year, seizures of calcium chloride in that country increased to almost 46 tons, a level second only to that reported by Colombia (more than 71 tons). Seizures in Ecuador decreased for the second consecutive year, to about 28 tons (see figure X). In addition, the topic of the seizures in Ecuador was featured in investigative media reports in 2020 and 2021, in which it was suggested that one of the companies concerned had stopped selling calcium chloride in South America.

161. A variety of common **solvents** are used in the extraction of cocaine base from coca leaves and for the conversion of cocaine base into hydrochloride salt. Most of the solvents can be replaced by others with similar properties, and the preference for a particular solvent is often a result of its accessibility and the illicit operators' experience with it.

162. With regard to seizures of solvents required for the final conversion of cocaine base into cocaine hydrochloride, the overall situation in 2020 was similar to previous years. Significant seizures of solvents, whether under international control or not, continued to be reported by countries in South America, totalling more than 81 per cent of the volume of solvents reported seized worldwide. Within that region, in the period 2016–2020, about 21 per cent of the total volume of solvents seized consisted of acetone and methyl ethyl ketone, two solvents in Table II of the 1988 Convention, while 79 per cent consisted of solvents that are not under international control (see figure XI) but that are under national control in several countries in the region, namely, acetate solvents and methyl isobutyl ketone.

163. Cocaine-related incidents, typically involving so-called secondary extraction, or "washing", laboratories, also continued to be reported in Europe. In the period 2020–2021, the Board became aware of 11 such incidents in the Netherlands. The chemicals seized included acids and solvents listed in Table II of the 1988 Convention, non-scheduled substitutes, such as acetate solvents, and bases. Several thousand litres of solvents were seized, reflecting the methods used by these laboratories, in which cocaine is recovered after being mixed with, or incorporated into, other substances for the purpose of smuggling. Most of the chemicals were sourced from within the European common market. Seizures also included cutting agents used for bulking the resulting cocaine hydrochloride. Cocaine extraction laboratories have also been encountered in Spain.

C. Substances used in the illicit manufacture of heroin

1. Acetic anhydride

164. Acetic anhydride – used primarily in the manufacture of heroin but also in the illicit manufacture of P-2-P and, subsequently, amphetamine and methamphetamine, as well as in the illicit manufacture of *N*-acetylanthranilic acid, a precursor for methaqualone – is one of the most frequently traded substances in Table I of the 1988 Convention. The extent of diversion of acetic anhydride from international trade channels remains limited, but diversion of the substance from domestic trade and distribution channels is gaining importance. A significant portion of recent global acetic anhydride seizures, including in Afghanistan and its neighbouring countries, continued to originate in China and the European Union (see also para. 19 above).

Licit trade

165. From 1 November 2020 to 1 November 2021, 1,974 shipments of acetic anhydride destined for 84 importing countries were pre-notified by 22 exporting countries. About 65 per cent of the total amount of acetic anhydride pre-notified during the reporting period was destined for a limited number of companies in Belgium[23] and was believed to have been imported for further distribution within the European Union.

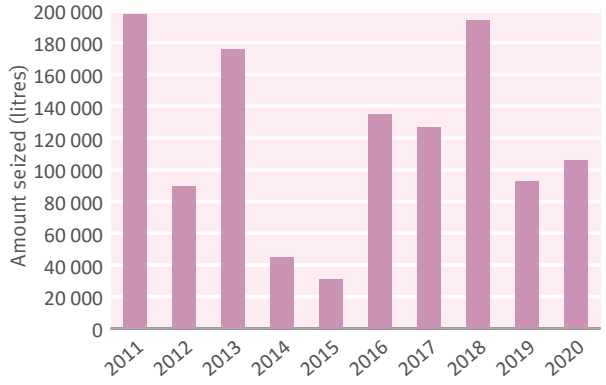
166. About 4 per cent of the shipments of acetic anhydride pre-notified worldwide during the reporting period were objected to by the importing countries concerned. In particular, authorities in the United States objected to 50 per cent of the shipments of acetic anhydride pre-notified by authorities in Mexico, for administrative reasons. In the past four reporting periods, authorities in the United States objected to an average of 80 per cent of the shipments of acetic anhydride pre-notified by authorities in Mexico. **The Board encourages the Governments of Mexico and the United States and other Governments with high rates of objections to analyse and address the root causes, and to take mutually acceptable remedial measures, as deemed appropriate, to increase the efficiency of administrative control over the trade in acetic anhydride, without compromising the capacity of the countries concerned to identify and address actual diversions of the substance from either domestic or international trade.**

[23] The imports of acetic anhydride into Belgium also included pre-notified shipments of the substance originating in the United Kingdom. Such shipments were not pre-notified at the time when the United Kingdom was a State member of the European Union.

Trafficking

167. In the period 2011–2020, seizures of acetic anhydride reported by Governments on form D totalled between 31,000 litres and 198,000 litres per year and totalled 1,195,000 litres for the period overall (see figure XII). China (354,000 litres), Afghanistan (182,000 litres), Mexico (148,000 litres), the Islamic Republic of Iran (113,000 litres), Pakistan (107,000 litres) and Turkey (100,000 litres) were the countries that reported seizures of 100,000 litres or more of the substance during that period. According to information communicated through PICS, countries in West and Central Europe (27 incidents) and China (11 incidents), as well as Taiwan Province of China (4 incidents) and the United Arab Emirates (4 incidents), were among the most frequently identified countries of origin or departure for the acetic anhydride seized worldwide in the past two decades.

Figure XII. Seizures of acetic anhydride, as reported by Governments on form D, 2011–2020



168. On form D for 2020, 17 countries and territories reported seizures of acetic anhydride. The largest volume was reported by China (48,900 litres), followed by the Islamic Republic of Iran (15,000 litres), the United Arab Emirates (13,300 litres), Myanmar (12,200 litres) and Turkey (12,100 litres).

169. The total amount (106,000 litres) of acetic anhydride reported seized worldwide in 2020 did not indicate any major impact on the availability of the substance for illicit purposes as a consequence of restrictions on the movement of people and goods resulting from the COVID-19 pandemic. In the first 10 months of 2021, only eight seizures of acetic anhydride, amounting to 24,900 litres, were communicated through PICS. From other sources of information, the Board is aware of purported additional seizures of the substance in 2021, which had not been communicated through PICS at the time of writing.

170. In 2020, seizures of acetic anhydride in Afghanistan amounted to only 656 litres, 130 litres less than in 2019, and represented the smallest amount of the substance seized in the country since the Government of Afghanistan started reporting seizures of precursors on form D in 2008. In the first 10 months of 2021, Afghanistan only communicated one seizure of the substance through PICS, involving 18 litres. The small amount of acetic anhydride seized in Afghanistan in 2020 does not, however, indicate a diminished need for the substance for the illicit manufacture of heroin, as corroborated by seizures of large amounts of acetic anhydride elsewhere, including in West Asia, believed to be destined for Afghanistan. The small volume of acetic anhydride seized may, however, in part be attributed to an increase in the trafficking of acetyl chloride, an alternative acetylating agent that could replace a portion of the acetic anhydride used in illicit heroin laboratories (see paras. 182–184 below).

171. With regard to Central Asian countries bordering Afghanistan, the situation regarding acetic anhydride trafficking has not significantly changed in the past two decades. Since 2000, Tajikistan and Uzbekistan are the only countries to have reported seizures of the substance on form D, having reported a combined total of 335 litres in the period 2017–2019. There were no reported seizures of the substance in Tajikistan, Turkmenistan or Uzbekistan in 2020.

172. Pakistan did not submit form D for 2020. However, three seizures of acetic anhydride totalling 5,130 litres were communicated through PICS. The largest of these seizures took place in the seaport of Karachi, Pakistan in June 2020 and involved 2,972 litres of the substance, allegedly originating in China. No seizures of acetic anhydride were communicated by Pakistan in the first 10 months of 2021. From a media report,[24] INCB is aware that in 2021 authorities in Pakistan arrested an individual who had been involved in the trafficking of large amounts of acetic anhydride to Pakistan through the United Republic of Tanzania in 2016. Further details of the case, the investigation of which was supported by several countries and the Board, are contained in the Board's reports for previous years.[25] Confirmation of the arrest and the suspected links to the trafficking incident in 2016 is awaited.

[24] Faraz Khan, "CTD arrests two TTP suspects for 'terror-financing'", *The News* (e-paper), 28 September 2021.

[25] INCB report on precursors for 2016 (E/INCB/2016/4), paras.141–142; INCB report on precursors for 2018 (E/INCB/2018/4), para. 58.

173. In April 2020, the Islamic Republic of Iran seized a shipment of 13,900 litres (15,000 kg) of acetic anhydride, misdeclared as paint in the seaport of Bandar Abbas, Islamic Republic of Iran. The shipment was destined for Afghanistan and had reportedly been shipped from the United Arab Emirates.

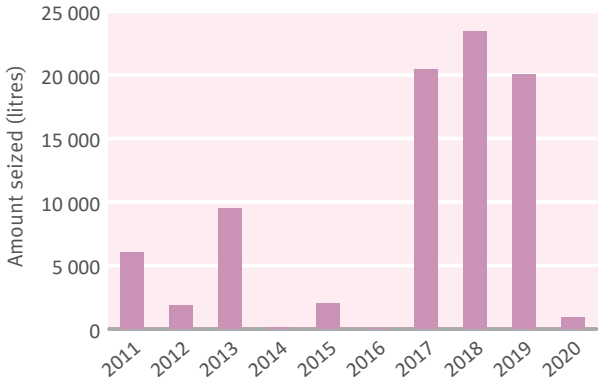
174. In June 2020, authorities of the United Arab Emirates seized a shipment of 13,300 litres of acetic anhydride in the port of Jebel Ali in Dubai. The consignment was smuggled in a sea container that had originated in Taiwan Province of China and had transited through the port of Bandar Abbas in the Islamic Republic of Iran. It was concealed in jerry cans and packed in cardboard boxes labelled as a motor oil. The labels were similar to others that had previously been found elsewhere in West Asia in connection with other seizures of acetic anhydride purportedly originating in Taiwan Province of China. Although the United Arab Emirates has frequently been used as a transit country for the trafficking of acetic anhydride, this was only the second seizure of the substance to be reported by the country since 2000.

175. Seizures of acetic anhydride in China reported on form D for the years 2011 to 2020 cumulatively accounted for 30 per cent of global seizures of the substance in that period. In 2020, China reported seizures amounting to 48,900 litres. However, no further information was provided.

176. From the mid-1990s until the early 2000s, seizures of acetic anhydride in Myanmar, one of the countries of the so-called Golden Triangle region of South-East Asia, amounted to, on average, about 8,000 litres annually. In the beginning of the 2010s, seizures of the substance in the country almost stopped, or were not reported, before resuming at the end of that decade. In 2019, seizures of the substance amounted to 4,100 litres. In 2020, three seizures of the substance in Shan State, Myanmar, amounted to a total of 12,200 litres, the second largest amount of the substance reported seized in Myanmar since 1999. The Board is also aware of a purported seizure of about 7,000 litres (7.5 tons) of acetic anhydride in Lang Son Province in Viet Nam in November 2020. The seizure was a result of cooperation between the authorities of China and Viet Nam and led to a further seizure of 22,000 litres (23.5 tons) of the substance in China. According to data provided on form D, the seizure in Viet Nam was the first seizure of acetic anhydride in the country since 1990.

177. Despite the continued illicit cultivation of opium poppy in Mexico, quantities of acetic anhydride seized in the country in recent years have been small. In 2019 and 2020, seizures of the substance amounted to 15 litres and 735 litres, respectively.

Figure XIII. Seizures of acetic anhydride, as reported by European Union member States on form D, 2011–2020



178. In April 2021, police in Guatemala seized about 4,000 litres of acetic anhydride. The seized substance may have been used either for the processing of locally cultivated illicit opium poppy or for further trafficking to Mexico. Prior to 2021, the last seizures of acetic anhydride in Guatemala were reported by the Government in 2011 (512 litres).

179. In the period 2011–2020, the largest amounts of acetic anhydride seized in Europe were reported by European Union member States. Specifically, the Netherlands (25,800 litres), Bulgaria (19,500 litres) and Spain (9,600 litres) together accounted for 63 per cent of the total of 87,600 litres seized in Europe in that period. In 2020, the quantities of acetic anhydride seized in European Union member States were significantly lower than in the period 2017–2019 (see figure XIII). European Union member States, however, continued to be reported as the source of the substance seized elsewhere, in particular in Turkey. By October 2021, the Netherlands was the only European Union member State having reported seizures of acetic anhydride (5,600 litres) in the course of the year.

180. On form D for 2020, Turkey reported nine seizures of acetic anhydride amounting to a total of 12,136 litres. The largest of the seizures involved 6,000 litres of the substance, smuggled from Germany. The Board is also aware of a purported seizure in the country of about 9,000 litres of acetic anhydride in March 2021. The suspected country of origin of the substance was Poland. In early June 2021, customs authorities in Turkey seized 14,955 litres (16.2 tons) of acetic anhydride that had transited Croatia, Serbia and Bulgaria. To circumvent detection, the traffickers had used two identical trucks equipped with a built-in device enabling the instant change of the trucks' number plates, to be activated in the case of a customs inspection.

2. Use of non-scheduled substances and other trends in the illicit manufacture of heroin

181. The illicit manufacture of heroin requires, in addition to acetic anhydride, a variety of other common chemicals not under international control. Moreover, the Board has alerted Governments to chemicals that have been known to be used as cover loads or to otherwise conceal acetic anhydride. There are also chemicals that can substitute for acetic anhydride as acetylating agents in the conversion of morphine to heroin.

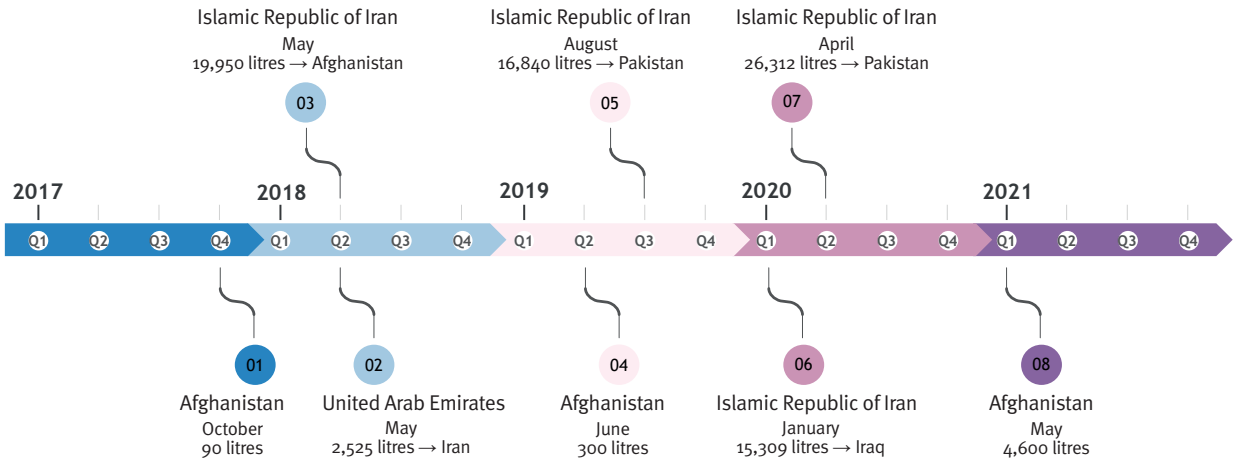
182. One such chemical is **acetyl chloride,** which is included in the INCB limited international special surveillance list of non-scheduled substances and is under national control in several countries worldwide, including Afghanistan and Pakistan. Since acetyl chloride is not under international control, its international trade is not monitored through the system of pre-export notifications, and patterns of international trade in and legitimate needs for the substance are not currently systematically available to the Board. However, because of its use as an acetylating agent, acetyl chloride is an important industrial chemical and hence is traded widely.

183. Because of its hazardous properties, acetyl chloride is more difficult to handle than acetic anhydride. This could be one of the reasons why incidents involving trafficking in the substance and reports of its use in illicit heroin laboratories have been rather rare in the past. In West Asia, the situation with regard to trafficking in acetyl chloride started to change around the period 2017–2018. Since then, a total of about 86,000 litres of acetyl chloride have been seized in Afghanistan, Iran (Islamic Republic of) and the United Arab Emirates (see figure XIV). This compares with the total of 137,800 litres of acetic anhydride seized in the three countries in the same period. The destination countries of the seized shipments of acetyl chloride were Afghanistan, Iran (Islamic Republic of), Iraq and Pakistan. China was identified as the source country when such information was available.

184. In 2021, the Turkish authorities seized 21.8 tons of what was reported as a mixture containing acetyl chloride, from a container purportedly shipped from China. This was the first time that acetyl chloride in that form was communicated through PICS. The amount of acetyl chloride in the mixture was not reported.

185. In 2018, the UNODC Country Office in Afghanistan conducted a forensic experiment that showed that heroin manufactured by means of acetylation of morphine with acetyl chloride produced unique acetylated sugars that could be used as markers. **The Board encourages all Governments with the necessary forensic capacity to analyse samples of seized heroin with a view to establishing whether acetic anhydride or acetyl chloride was used as the acetylating agent in the illicit manufacture of the heroin. Furthermore, the Board urges all countries concerned to take the necessary measures to fully investigate seizures of acetyl chloride and identify those involved in the trafficking of the substance. The Governments of countries that trade in acetyl chloride are encouraged to analyse patterns of licit trade in the substance and to review domestic control measures to verify, to the extent possible, the legitimacy of the past trade in and end uses of the substance. Voluntary cooperation with the private sector in this regard is also encouraged.**

Figure XIV. Seizures of acetyl chloride in Afghanistan, Iran (Islamic Republic of) and the United Arab Emirates, as reported on form D and communicated through PICS, 2017–2021



186. **Glacial acetic acid** is a chemical that has repeatedly been reported as being used as a cover load or to otherwise conceal acetic anhydride. It is also included in the INCB limited international special surveillance list. On form D for 2020, the amounts of glacial acetic acid reported seized worldwide totalled 1,700 litres, including 250 litres of the substance seized in Afghanistan.

187. **Ammonium chloride** is another non-scheduled chemical frequently associated with the illicit manufacture of heroin, in which it is used in the process of extracting morphine from opium. In 2020, China reported having stopped shipments to Myanmar of quantities of ammonium chloride totalling more than 18,000 tons; unfortunately, no further details were provided. Quantities of ammonium chloride seized in Afghanistan in 2020 amounted to a total of 11,300 kg, almost double the total amount seized in the country in the period 2017–2019 (6,200 kg). Mexico also reported a seizure of a significant amount of ammonium chloride (5,300 kg) on form D for 2020. However, the quantity reported, which had been seized in a single incident, may have been destined for the illicit manufacture of methamphetamine. Neither Afghanistan nor Mexico provided information on the origin of the substance.

D. Substances used in the illicit manufacture of other narcotic drugs and psychotropic substances

1. Ergot alkaloids and lysergic acid

188. Seizures of ergot alkaloids (ergometrine and ergotamine) and lysergic acid have traditionally been very small – typically in quantities less than 1 kg – because of the potency of the end product, LSD. Against that backdrop, on form D for 2020, only Australia, Canada, Georgia, Turkey and the United States reported notable seizures of lysergic acid. Australia also reported seizures of ergotamine. No further information was provided on any of the incidents. Shipments of lysergic acid and ergotamine seized in Australia were identified as having originated or departed from a number of countries, notably Germany and the Netherlands (in the case of the lysergic acid), and Singapore (in the case of the ergotamine).

2. *N*-Acetylanthranilic acid, anthranilic acid and alternative precursors of methaqualone

189. On form D for 2020, Mozambique reported seizures of *N*-acetylanthranilic acid totalling 1,320 kg, although no further details were provided. The second largest amount of the acid seized (156 kg) was reported by China. Small seizures of methaqualone precursors, totalling less than 2 kg, were reported by Canada and Germany (in descending order of amounts seized).

190. In September 2020, authorities in South Africa dismantled a warehouse in which significant amounts of chemicals, including anthranilic acid, and laboratory equipment were stored. However, there was no indication of methaqualone having been manufactured on site. It is the Board's understanding that investigations are ongoing to establish the source of the chemicals and the laboratory equipment.

191. In addition, during the first 10 months of 2021, South Africa communicated another incident through PICS involving 1,700 kg of acetanthranil, which had arrived from Kenya by air. Acetanthranil is a stable intermediate and immediate precursor of methaqualone that is converted through a single-step synthetic process. It has no known legitimate uses other than in the manufacture of substances related to methaqualone and it is not under international control. There have been four incidents involving acetanthranil in South Africa since November 2018, totalling more than 8.2 tons of the substance. Three incidents occurred at an airport and one in an illicit laboratory. They provide evidence of the fact that the African continent has not been spared from the emergence of non-scheduled chemicals and designer precursors.

3. Precursors of fentanyl, fentanyl analogues and other synthetic opioids, and alternative chemicals

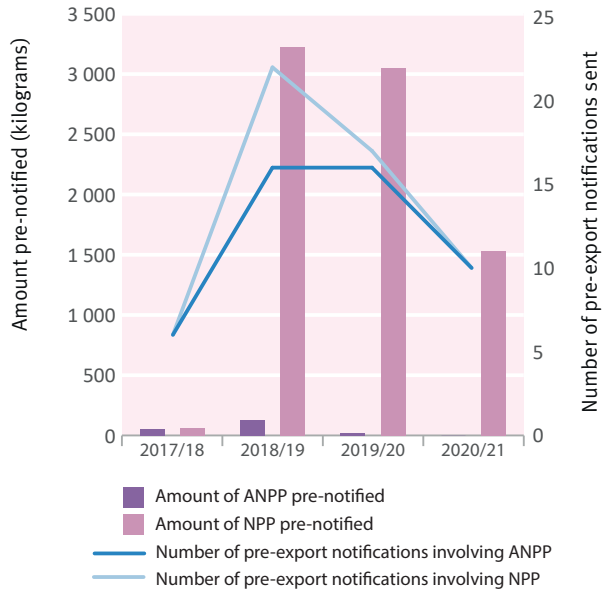
Licit trade

192. International trade in NPP and ANPP, the two fentanyl precursors under international control, is limited to a few exporting and importing countries. Between 1 November 2020 and 1 November 2021, 10 proposed shipments of NPP were pre-notified by the authorities of two exporting countries to six importing countries known to manufacture fentanyl legitimately. The total quantity involved was slightly more than 1.5 tons and thus amounted to only about half of the total quantity involved in each of the two previous reporting periods. The largest exporter of NPP was France.

193. With regard to ANPP, authorities of four exporting countries sent 10 pre-export notifications to nine importing countries and territories, involving a total of only a few grams of ANPP for research and laboratory analytical purposes. On form D for 2020, India reported having stopped, on the basis of the importing authority's objection, an export of 2 kg of ANPP to Brazil; had it been allowed to

proceed, it would have been the third largest shipment of ANPP ever pre-notified through PEN Online.

Figure XV. Proposed exports of the two fentanyl precursors, pre-notified by exporting Governments through the PEN Online system, 2018–2020[a]



[a] Reporting periods are from 1 November of the first year to 1 November of the following year.

Trafficking

194. On form D for 2020, the United States, Mexico and Estonia, in descending order of the amounts seized, were the only countries to report notable seizures of the two fentanyl precursors under international control. Interestingly, although there has been very limited international trade in ANPP, most of the reported seizures of fentanyl precursors in 2020 involved ANPP, totalling more than 340 kg in the United States and more than 100 kg in Mexico. While the amounts seized in the United States were reported to have been of domestic origin, Mexico identified China as the country of origin. The discrepancies observed between the legitimate trade in and seizures of ANPP suggest that the substance is sourced from illicit channels.

195. Mexico and the United States were also the only countries to report seizures of internationally non-scheduled alternative precursors of fentanyl. Specifically, Mexico reported seizures of almost 300 kg of **4-AP**. The United States seized about 10 kg of that substance, as well as nearly 75 kg of its masked derivative, **boc-4-AP**. Both of the substances were seized while transiting the United States from China or Hong Kong, China, to Mexico. In addition, boc-4-AP was encountered in Canada for the first time in 2020. From other sources, INCB is also aware of small seizures of 4-AP in Canada.

196. Seizures involving smaller amounts of boc-4-AP were also communicated through PICS in the first 10 months of 2021. In addition, data from PICS suggest a further evolution of fentanyl precursors, namely, a shift from 4-AP and a corresponding increase in incidents involving, and amounts of, **4-piperidone** and its monohydrate hydrochloride salt, as well as its masked derivative, **1-Boc-4-piperidone**. Seizures of these substances were effected in a seaport in Canada and at airports in Mexico and the United States. The alleged origin in the majority of the incidents was China, including Hong Kong. Two out of the seven consignments had been correctly declared at customs, while the others had been misdeclared. None of these chemicals are under international control, although INCB has previously alerted Governments to their role as alternative precursors.

197. Mexico and the United States also reported seizures of fentanyl precursor analogues and their masked derivatives, namely, precursors of *para*-fluorofentanyl, on form D for 2020.

198. Outside North America, the Netherlands reported an incident in October 2020 involving the seizure of several hundreds of litres of **aniline**, **(2-bromoethyl)benzene** and **propionyl chloride** from an illicit warehouse. The combination of the seized chemicals suggested that they may have been intended for the illicit manufacture of fentanyl or fentanyl analogues using any of the three major methods of manufacture of the substance. Irrespective of the method, however, in each case, additional chemical alternatives to the two fentanyl precursors under international control would have been necessary for the synthesis.

E. Substances not listed in Table I or Table II of the 1988 Convention that are used in the illicit manufacture of other narcotic drugs and psychotropic substances or substances of abuse not under international control

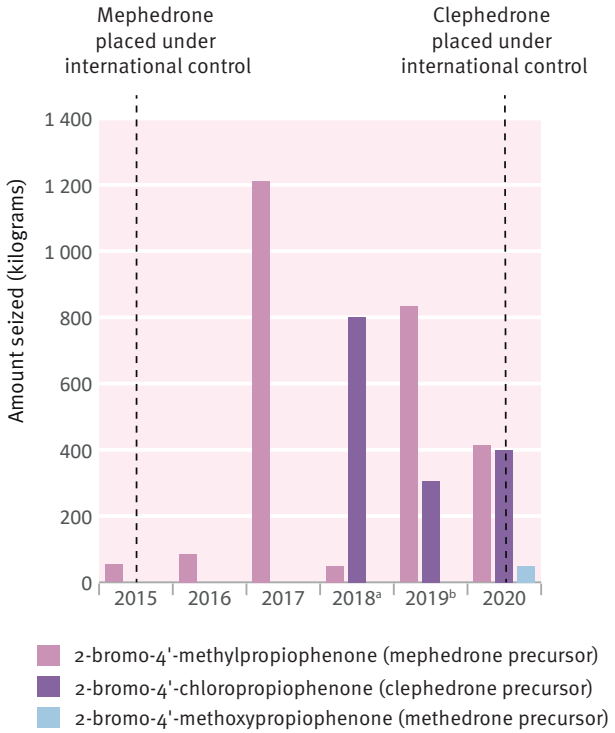
1. Precursors of GHB

199. **GBL** is a chemical precursor of GHB but may also be directly ingested, as it is metabolized into GHB in the body. Because of this "dual use", GBL may be controlled nationally as precursor or as a psychotropic substance. As a result, not all countries where GBL is controlled nationally submit reports on seizures of the substance to INCB. On form D for 2020, 13 countries reported seizures of GBL. The largest amounts seized were reported by the Netherlands (21,000 litres) and Slovenia (12,700 litres); in

both countries, the total amounts were seized in single incidents, in a warehouse in the Netherlands, and as a transit consignment to Austria, in Slovenia. As in past years, except for the seizures reported by the United States, all seizures of GBL reported on form D for 2020 were reported by European countries. Some European countries, and Australia, did not report seizures of GBL on form D but shared incidents involving the substance through PICS. Seizures in Australia totalled almost 1 ton in 2020 and occurred exclusively at airports. As in the past, shipments of GBL seized in Australia originated predominantly in China, including Hong Kong, while the Netherlands was identified as the country of origin, where such information was available, of the quantities seized in Europe.

200. Seizures of GBL communicated through PICS in the first 10 months of 2021 totalled more than 1.8 tons, with about 72 per cent of the incidents having been communicated by Australia. Seizures of **1,4-butanediol**, a precursor of GBL and pre-precursor of GHB that is also readily converted to GHB upon ingestion, were negligible in 2020.

Figure XVI. Seizures of three precursors of three synthetic cathinones, as reported by Governments on form D, 2015–2020



[a] The amount of 2-bromo-4'-chloropropiophenone seized was communicated through PICS but not on form D.
[b] Out of this amount of 2-bromo-4'-methylpropiophenone, a total of 800 kg were communicated through PICS but not reported on form D.

2. Precursors of new psychoactive substances, including substances recently scheduled under the Single Convention on Narcotic Drugs of 1961 as amended by the 1972 Protocol or the Convention on Psychotropic Substances of 1971

201. There has been no systematic reporting on seizures of precursors of new psychoactive substances and substances recently placed under international control. As in past years, in 2020, such seizures were typically reported by a number of European countries and involved precursors of synthetic cathinones. Specifically, on form D for 2020, the largest reported seizures involved **2-bromo-4'-chloropropiophenone** (a precursor of various 4-chloro-substituted cathinone derivatives, such as 4-CMC (clephedrone)) and **2-bromo-4'-methylpropiophenone** (a mephedrone precursor), totalling 400 kg and 405 kg, respectively. In addition, two seizures amounting to 50 kg of **2-bromo-4'-methoxypropiophenone** (a methedrone precursor) were also reported.

202. In the first 10 months of 2021, a seizure of 139 kg of 2-bromo-4'-methylpropiophenone was communicated through PICS by Austria. In addition, the detection of laboratories for the illicit manufacture of mephedrone and *alpha*-pyrrolidinopentiophenone (*alpha*-PVP) and corresponding seizures of precursors in the Russian Federation continued to be communicated in 2020 and 2021.