National Metadata Structure (NMDS) - Chemical and Petrochemical Statistics at a Glance

Item No	Concept name	Details
1	**Contact**	
1.1	Contact Organisation	Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilizers
1.2	Compiling agency	Statistics and Monitoring (S&M) Division
1.3	Custodian agency	Statistics and Monitoring (S&M) Division
1.4	Contact Details	a. Name of Organisation owning the processes and outputs: Statistics and Monitoring (S&M) Division d. Name: Sh. Ganga Kumar e. Designation: Deputy Director General f. Postal address: Room No. 419-A, Shastri Bhawan, New Delhi-110001 g. email address: ddgoffice-docp@gov.in h. Contact number: 011-23387761 i. Fax number: 011-23388628
2	**Data Description and Presentation**	
2.1	Data description	Production, Installed Capacity, Import and Export of selected major Chemical and Petrochemical products.
2.2	System of Classification	1. The National Industrial Classification (NIC) for manufacturing sector 2. The Indian Trade Classifications Nomenclature (ITC-HS)
2.3	International/ National Standards Classification etc.	1. The National Industrial Classification (NIC) for manufacturing sector 2. The Indian Trade Classifications Nomenclature (ITC-HS)
2.4	Sector coverage	Chemical sector under the NIC Division 20 and Harmonized System (HS) chapters 28, 29, 32, 38, 39, 4002, 54 and 55
2.5	Concepts and definitions	As per **Annexure.**
2.6	Unit of compilation	Information is sought for chemical and petrochemical products.
2.7	Population coverage	Large and Medium Scale industries/ units of chemical sector under NIC-20 Division have been taken across the country.
2.8	Reference Period	Annual (Financial Year)
2.9	Duration and period of enumeration	Yearly
2.10	Sample size/Dataset Size	Production and Installed Capacity data has been collected from the large and medium scale industries/ units of chemical sector.

2.11	Data Confidentiality	Data is released by product-wise and group-wise. Unit level data received from industries/ units of chemical sector are not released, so as to maintain the confidentiality of the individuals.
3	**Institutional Mandate**	
3.1	Legal acts and other agreements	Data is collected under the Collection of Statistics Act, 2008 (7 of 2009) and read with rules 5 and 7 of the Collection of Statistics Rules, 2011.
3.2	Data sharing/Data Dissemination	Data is available on website or shared through correspondence.
3.3	Release calendar	Annual
3.4	Frequency of dissemination	Annual
3.5	Data access	The dataset is available in the annual publication "Chemical and Petrochemical Statistics at a Glance" on the website *https://chemicals.gov.in/statistics-glance* **Title:** Given on each table. **Dataset Edition:** Mentioned in respective columns **Dataset Reference data type:** .pdf and .xls **Presentation Format:** Table and Graph **Dataset Language:** English **Status/Version:** Only final data for each edition is published.
4	**Quality Management**	
4.1	Documentation on methodology	Not available
4.2	Quality documentation	The persons authorised by the Statistics Officer would be engaged in the jurisdiction of the Statistics Officer for verification of information furnished by each informant, for inspecting relevant records, and for seeking clarifications, as may be necessary. Each authorised person would carry a photo identity card or letter of authorisation issued by the Statistics Officer.
4.3	Quality assurance	Not available
5	**Accuracy and Reliability**	
5.1	Sampling error	Not available
5.2	Measures of reliability	Not available
6	**Timeliness**	
6.1	Timeliness	One Year
7	**Coherence and Comparability**	
7.1	Comparability – over time	The dataset is comparable over yearly time period.
7.2	Coherence	None
8	**Data Processing**	

8.1	Source data type	Administrative Data source for Production and installed capacity: Monthly Production Reports (MPRs) received from Large and Medium Scale chemical and petrochemical industries. Data Source for Import and Export: DGCIS (Kolkata)
8.2	Frequency of data collection	a) Production and Installed Capacity of the Chemical and Petrochemical Products: Monthly b) Data for Import and Export of select major chemical and Petrochemical Products: (i) Quarterly data is received from DGCIS, Kolkata (ii) Annual data received from portal of DGCIS, Kolkata (access given to DCPC)
8.3	Mode and method of data collection method	a) Production and Installed Capacity: Data is being collected through Monthly Production Reports (MPRs) received from selected Large and Medium Scale chemical and petrochemical industries. b) Import and Export: (i) Quarterly data is received from DGCIS, Kolkata (ii) Annual data received from portal of DGCIS, Kolkata (access given to DCPC)
8.4	Data validation	1. Consistency within the source data and variation from the previous period is examined. 2. Data collected from industries/units has been verified on a sample basis through comparative analysis of last several years.
8.5	Data compilation	1. The Production data received as Monthly Production Reports (MPRs) of the Large and Medium Scale industries/ units which is processed via an offline data entry on departmental platform (Web Based Queries on Production Monitoring System). 2. The Installed Capacity data received from the Large and Medium Scale industries/ units which is further compiled. 3. Import and Export data is received on a quarterly basis from DGCIS, Kolkata and further uploaded on the departmental platform. Annual data of Import and Export received through portal of DGCIS, Kolkata (access given to DCPC).
	Data identifier(s)	Not available
9	**Metadata Update**	
9.1	Metadata last posted	January, 2025
9.2	Metadata last update	December, 2025

Annexure

1.0 Chemicals can be broadly divided into the following sub-groups:

Two broad categories within the chemical industry, each with its own characteristics and purposes are:

1. Basic Chemicals are known as commodity-type chemicals which are usually produced in large quantities and are essential for the manufacturing of a wide range of goods.

   Examples of basic chemicals include:

   I. **Petrochemicals:** Chemicals derived from petroleum or natural gas, such as ethylene, propylene, and benzene, used as raw materials for plastics, synthetic fibres, and more.

   II. **Inorganic Chemicals**: Chemicals like sulphuric acid, chlorine, and ammonia used in various industrial processes, including manufacturing fertilizers and metals.

   III. **Bulk Polymers**: These are polymers produced in large quantities, such as polyethylene, polypropylene, and polyvinyl chloride (PVC), which are used in plastics manufacturing.

2. Specialty Chemicals are higher value-added chemicals that are produced in smaller quantities and are often tailored to specific applications. These chemicals provide unique properties or functions and are used in various industries, including pharmaceuticals, electronics, cosmetics, and more.

   Examples of specialty chemicals include:

   I. **Pharmaceutical Intermediates**: Chemical compounds used as intermediate steps in the production of pharmaceutical drugs.

   II. **Agrochemicals:** Chemicals like pesticides, herbicides, and fertilizers used in agriculture to enhance crop yield and protect plants from pests and diseases.

   III. **Performance Chemicals**: Chemicals designed to provide specific properties, such as flame retardants, anti-corrosion agents, and coatings.

   IV. **Electronic Chemicals**: Chemicals used in the manufacturing and assembly of electronic components, such as semiconductors and printed circuit boards.

2.0 Further, Chemicals are broadly classified into the following groups:

I. Alkali:

Alkali also known as a base, are typically found on the opposite end of the pH scale with pH values above 7 and are known for their ability to neutralize acids and react with them to form salts and water in a process called neutralization.

The main characteristics of alkalis include:

- They taste bitter unlike acids which taste sour.
- They are slippery or soapy to touch due to the reaction of alkalis with the natural oils on the skin, forming soap-like substances.
- They have the ability to turn red litmus paper blue.
- They react with acid, to form salt and water, neutralizing the acidic properties.
- The pH scale ranges from 0 to 14, with 7 being neutral, alkalis have pH values greater than 7, indicating their basic nature.

Examples of alkalis include sodium hydroxide (NaOH), potassium hydroxide (KOH), calcium hydroxide (Ca (OH)2), and ammonia (NH3).

II. Inorganic chemicals:

Inorganic chemicals are chemical compounds that do not contain carbon-hydrogen (C-H) bonds.

Key characteristics of inorganic chemicals include:

- They contain elements such as metals, non-metals, and metalloids. They can form various ionic or covalent bonds without the presence of carbon-hydrogen bonds.
- They encompass a diverse range of compounds. Examples include salts (such as sodium chloride), metals and metal oxides (like iron oxide), minerals (e.g., calcium carbonate), acids and bases (like sulfuric acid and sodium hydroxide, respectively) etc.
- They are naturally occurring and can be found in minerals, rocks, soil, water, and the atmosphere.
- They are used in agriculture Industry as fertilizers, in medicine field as metal-based drugs or contrast agents for medical imaging, in construction for cement production, in electronics for semiconductor materials, and in many other fields.

- They are either highly stable or can react and participate in redox reactions.

Exceptions: organometallic compounds, which contain metal-carbon bonds are considered a blend of organic and inorganic chemicals

III. Organic Compounds:

Organic chemicals contain carbon atoms bonded with other elements such as hydrogen, oxygen, nitrogen, sulphur, and more.

Key characteristics of organic chemicals include:

- They contain carbon atoms, which have the unique ability to form stable covalent bonds with other carbon atoms and various other elements.
- They include a vast array of compounds, ranging from simple hydrocarbons like methane and ethane to complex molecules like proteins, carbohydrates, lipids, and nucleic acids.
- They form the basis of biomolecules such as sugars, amino acids, fatty acids, and nucleotides, which are crucial for the structure and functioning of cells and living organisms.
- They are used in pharmaceuticals, plastics, synthetic rubber, dyes, pesticides, solvents, perfumes, and many other products.

Note: carbonates, carbides, and cyanides are examples of carbon-containing compounds that fall under the domain of inorganic chemistry, not organic.

IV. Dyes and Pigments:

Dyes and pigments are both colouring agents used to add colour to various materials even though they serve a similar purpose, there are fundamental differences in their properties and applications.

Key characteristics of dyes include:

- They are soluble in liquids, which allows them to be easily applied to different materials.
- They are generally transparent or semi-transparent, allowing the underlying material's colour or texture to show through.
- They are absorbed into the material, resulting in a more permanent and vibrant coloration.
- They are commonly used in the textile industry for colouring fabrics, in the printing industry for inks, and have other applications like food colouring, cosmetics, and medical dyes.

Key characteristics of pigments include:

- They are insoluble in the medium they are applied to, which means they do not dissolve but remain as solid particles.
- They are generally opaque, meaning they cover the underlying material's colour and texture, providing excellent hiding power.
- They are often more stable and resistant to fading than dyes, making them suitable for outdoor applications and products that need to withstand exposure to light, heat, and other environmental factors.
- Pigments are commonly used in paints, coatings, plastics, ceramics, and various other applications.

V. Pesticides and Insecticides:

Pesticides are chemical substances or mixtures of chemicals that are used to mitigate, or eliminate Pests i.e., insects, weeds, fungi, rodents, and other organisms to protect agricultural crops and indirectly protect human health and livestock from their adverse effects.

Pesticides are grouped according to the types of pests they kill, such as:

- Larvicides – Target larvae of insects
- Insecticides: Target insects and arthropods
- Herbicides: Target unwanted plants, commonly known as weeds
- Fungicides: Target fungi and mold that can damage plants
- Rodenticides: Target rodents like rats and mice
- Nematicides: Target nematodes, microscopic worms that can harm plants
- Bactericides and Virucides: Target bacteria and viruses that affect plants

Key characteristics of Pesticides include:

- They help increase agricultural productivity by protecting crops from pests that can cause yield losses.
- They also contribute to reducing the spread of disease vectors, such as mosquitoes carrying malaria or ticks carrying Lyme disease.
- However, their use needs to be balanced with careful consideration of potential environmental and health impacts.
- They are formulated as liquids, powders, granules, aerosols, or gases for specific application methods, such as spraying, dusting, or fumigation.

Examples of common pesticides and insecticides include organophosphate are insecticides, they affect the nervous system of insect, carbamate also affect the nervous system of insect, pyrethroid are synthetic version of pyrethrin, a naturally occurring pesticide, found in chrysanthemums (Flower) etc.

3.0 Petrochemicals are broadly classified into the following groups:

I. Synthetic Fibres:

Synthetic fibres, also known as man-made fibres or synthetic textiles are engineered to have specific properties, making them suitable for various applications in the textile industry. They are designed to imitate or enhance the characteristics of natural fibres like cotton, silk, or wool, while offering distinct advantages.

Key characteristics of Synthetic fibres include:

- They are not derived from natural sources like plants or animals instead, they are created by polymerizing synthetic materials derived from petrochemicals or other raw materials.
- They can be engineered to have a wide range of properties, including strength, durability, elasticity, water resistance, and colourfastness allowing them to be tailored for specific uses.
- They exhibit resistance to chemicals, mildew, and insects, making them suitable for applications where natural fibres might be less durable.
- They are used in a variety of products, including clothing, home furnishings, industrial textiles, geotextiles, ropes, medical textiles, and more.

Examples of synthetic Fibres include polyester, nylon, acrylic, polypropylene, rayon (Viscose) etc.

II. Polymers:

Polymers are composed of repeating units called monomers. These monomers are chemically bonded together in long chains or networks, to form large molecules. Polymers can be natural or synthetic and have a wide range of applications in various fields.

Key features of polymers include:

- These monomers can be identical or different, linked together through chemical bonds to create the polymer chain. Some polymers can have thousands or even millions of monomer units in their structure.
- They have higher molecular weights being made up of repeating units, resulting in a larger mass for each molecule.
- They have diverse properties, such as flexibility, strength, elasticity, thermal resistance, and electrical conductivity, hence are chemical processed to form materials like plastics, synthetic fibres, and rubber.
- Being versatile they have applications in various industries, such as packaging, textiles, construction, electronics, automotive, healthcare, and more.

Examples of common synthetic polymers include polyethylene (used in in plastic bags, bottles, and various packaging materials), polypropylene (found in automotive parts, textiles, and household items), polyvinyl chloride (PVC) (used in pipes, electrical insulation, and vinyl products), polystyrene (used in foam packaging and disposable utensils) polyethylene terephthalate (PET) (used in beverage bottles and synthetic fibres (e.g., polyester).

III. Synthetic rubber

Synthetic rubber also known as elastomers, is a man-made material designed to imitate the properties and characteristics of natural rubber obtained from the latex sap of certain plants.

Key characteristics of synthetic rubber include:

- It is produced by polymerizing various petrochemical-derived monomers, using either emulsion polymerization or solution polymerization.
- They can be engineered to have specific properties, such as elasticity, flexibility, durability, resistance to heat, chemicals, and weathering, making it suitable for diverse applications.
- It is used manufacturing of tires (largest application of synthetic rubber), gaskets, belts, hoses, rubber soles, in industrial goods such as conveyor belts, seals, and in consumer goods such as gloves, swimwear, and inflatable items etc.

Examples of common synthetic rubber include styrene-butadiene rubber (SBR), polybutadiene rubber (BR), neoprene (chloroprene rubber), and nitrile rubber (NBR).

VI. Synthetic detergent:

Synthetic detergents, commonly known as detergents, are cleaning agents that are specifically formulated to remove dirt, stains, grease, and other contaminants from various surfaces. Unlike soap, which is produced via saponification of natural fats and oils, synthetic detergents are chemically synthesized compounds designed to provide effective cleaning

Key characteristics of synthetic detergents include:

- Their molecules allow detergents to break down and emulsify grease and oils, enabling them to be washed away with water.
- They are effective in both soft and hard water i.e., even in presence of calcium and magnesium ions, synthetic detergents do produce lather and maintain their cleaning efficiency.
- They are used in various cleaning products, including laundry detergents, dishwashing liquids, surface cleaners, shampoos, body washes, and more.

- They contain chemicals that may have environmental impacts, surfactant containing wastewater, if discharged into the environment, results in harming aquatic life, polluting the water and endangering human health. Therefore, there's a growing interest in developing environmentally friendly detergents.

Examples of common synthetic rubber include sodium lauryl sulphate (SLS) (used in personal care products like shampoos, body washes, and toothpaste) cetyl trimet04hyl ammonium chloride (CTAC) (used in fabric softeners, hair conditioners, and some industrial cleaners) linear alkyl benzene sulfonate (LAS) (used in laundry detergents and household cleaners).

V. Performance plastics

Performance plastics, also known as engineering plastics or high-performance polymers, offer advanced mechanical, thermal, electrical, and chemical properties and are specifically designed to withstand challenging conditions and provide enhanced performance compared to standard or commodity plastics.
Key features of performance plastics include:

- They can maintain their mechanical properties over a broad temperature range, from high-temperature applications to extremely low temperatures.
- They often have higher tensile strength, impact resistance, and toughness compared to standard plastics.
- They are resistant to various chemicals, acids, solvents, and corrosive substances, making them suitable for applications involving contact with aggressive environments.
- Some of them exhibit excellent electrical insulating properties and can be used in applications requiring high dielectric strength.
- They have low coefficients of thermal expansion and exhibit minimal creep, maintaining their shape and size even under stress and temperature changes.
- They can have self-lubricating properties, reducing wear and friction in moving parts.
- They have inherent flame-retardant properties, making them suitable for applications where fire safety is a concern.
- Despite their enhanced properties, they are often lighter than metals, making them useful in weight-sensitive applications.

Examples of performance plastics include: polyether ether ketone (PEEK) (used in aerospace, medical implants, and industrial applications.) polytetrafluoroethylene (PTFE) known as Teflon, PTFE (used in non-stick cookware, gaskets, and seals) polyimides (PI) (used in aerospace, electronics,

and automotive applications) polyphenylene sulphide (PPS) used in automotive parts, electrical components, and industrial applications.

VI. Fiber intermediates:

Fiber intermediates serve as precursors in the production of synthetic fibres. These intermediates are transformed into polymers through various chemical processes, which are then spun into fibres for use in textiles, plastics, and other applications.

Key points about fibre intermediates include:

- They are the initial building blocks used to create the polymers that form synthetic fibres which are then processed into fibres through spinning and other techniques.
- They may undergo chemical modifications to enhance their properties or adjust their characteristics for specific applications.
- Once they are transformed into polymers and then fibres, can be further processed into textiles, garments, industrial materials, and other products.

Examples of fibre intermediates and their corresponding synthetic fibres include: terephthalic acid and ethylene glycol are combined to produce polyethylene terephthalate (PET) polymer used in textiles, bottles, and packaging. adipic acid and hexamethylenediamine react to form nylon 6,6 polymer used in nylon fibres used in acrylonitrile and other monomers used in the production of acrylic fibres, which have applications in textiles, clothing, and outdoor fabrics. caprolactam polymerized to create nylon 6 polymer, used in textiles and engineering plastics.

VII. Olefins

Olefins, also known as alkenes, are a class of unsaturated hydrocarbons with at least one carbon-carbon double bond in their molecular structure. They are an important group of organic compounds widely used in various industrial processes and applications. Olefins are commonly found in the production of plastics, polymers, and other chemicals.

Key characteristics of olefins include:

- The defining feature of olefins is the presence of a carbon-carbon double bond (C=C) in their chemical structure. This double bond gives them unique reactivity and properties.
- They are unsaturated hydrocarbons, meaning they have fewer hydrogen atoms in their structure compared to their saturated counterparts (alkanes).

- Due to the presence of the double bond, they readily undergo addition reactions, where atoms or groups of atoms are added to the double bond.
- They are crucial feedstocks in the petrochemical industry, are obtained from the cracking of hydrocarbons in processes like steam cracking, which breaks down larger hydrocarbon molecules into smaller olefin molecules.
- They serve as starting materials for the production of various polymers, including polyethylene and polypropylene.
- They are used to produce a wide range of products, including plastics, synthetic rubber, solvents, detergents, and more.

Examples of olefins include ethylene (simplest olefin), propylene (used in the production of plastics, synthetic rubber, and various chemicals), Butenes (used in the production of synthetic rubber, plastics, and fuels), hexenes and heptenes (as intermediates in the synthesis of chemicals and polymers), octenes and nonenes (used in the production of detergents, lubricants, and specialty chemicals)

VIII. Aromatics

Aromatics contain a specific type of cyclic structure called an aromatic ring or benzene ring which is stable and highly conjugated, having alternating single and double bonds.
Key characteristics of aromatic compounds include:

- They are highly stable due to the resonance (delocalization) of electrons over the entire ring. This resonance leads to a distribution of electron density that helps stabilize the molecule.
- They exhibit distinct reactivity patterns i.e., they undergo electrophilic aromatic substitution reactions, where a hydrogen atom in the ring is replaced by another atom or group.
- They are used as starting materials in the production of many chemicals, including plastics, dyes, pharmaceuticals, and solvents.

Examples of olefins include benzene (C_6H_6), simplest example which has a hexagonal ring with three alternating double bonds, toluene, xylene, naphthalene, and various aromatic compounds found in essential oils and perfumes.

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