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GLOSSARY OF TERMS RELATING TO COAL
CARBONIZATION PRODUCTS
(First Revision)

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

November 2001
Price Group 4

Reaffirmed - 2011
FORESWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Bitumen, Tar and their Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This Indian Standard on glossary of terms relating to coal carbonization products was originally published in 1969. The sectional committee felt that the standard does not cover all aspects of coal carbonization technique and therefore, taking cognizance of rapid progress in coal carbonization industry, the carbonization terms in vogue and referred in coke oven practices, decided to revise the same.

In the preparation of this standard, considerable assistance has been derived from the following publications:

1. ISO 1543:1981 Bensole Industry — Vocabulary used in the benzole industry

The composition of the Committee responsible for formulation of this standard is given in Annex A.
1 SCOPE
This standard defines technical terms relating to coal carbonization product.

2 TERMINOLOGY

A

Acid Sludge — The residue obtained during the acid washing of crude benzole.

Ammoniacal Liquor — A dilute aqueous solution of ammonia (up to about 3 percent) and ammonium salts (mainly sulfide, carbonate and chloride) together with phenols and other organic compounds, formed in hydraulic mains, condensers and scrubbers.

Ammoniacal Liquor, Concentrated — An aqueous solution of ammonia (15 to 25 percent) and ammonium salts, produced by distilling ammoniacal liquor under such conditions that part of the carbon dioxide and hydrogen sulphide is removed.

Ammonia, Fixed — Ammonia in the form of ammonium salts in solution from which ammonia is not liberated when the solution is boiled.

Ammonia, Free — Ammonia liberated by boiling a solution of ammonium salts or ammonia.

Ammonia Still Effluent — A dark red-brown liquid resulting from distillation of ammoniacal liquor. Non-volatile acid radicals are present as calcium salts, if the ammonia compounds have been decomposed by distillation with lime, but otherwise they are present as ammonium salts. A proportion of the phenols present in the food to the still remain in the effluent liquor.

Anthracene, Crude — The solid product, containing anthracene, obtained on cooling the coal tar distillate collected above 270°C.

Anthracene Oil — The heaviest distillable coal tar fraction with distillation range 271°C-399°C containing creosote oil anthracene, phenanthrene, carbazole and so on.

Anthracene Paste/Powder — Unrefined crude anthracene containing 15 to 35 percent (m/m) anthracene. The material is usually in the form of paste owing to presence of oil content.

Anthracene 40 percent — A quality crude anthracene purified to an anthracene content of approximately 40 percent (m/m) and a solid paraffins content not exceeding 0.05 percent (m/m).

B

Bases, Crude Tar — The mixture of those constituents which may be extracted from distillates of coal tar by dilute mineral acid and subsequent sprinkling by alkali. The mixture consists essentially of basic compounds of the pyridine or quinoline series or both.

Bases, Refined Tar — A mixture of tar bases obtained by processing of crude tar bases consisting essentially of pyridine and its homologues. In the trade, a mixture of tar bases distilling less than 20 percent at 160°C is sometimes known as ‘refined heavy bases’.

Beehive Coke — Coke obtained by carbonization of coal in a beehive oven.

Benzole and Allied Products — Collection of aromatic hydrocarbons (benzene and its homologues) pure or commercially pure, isolated or in mixtures, and whether or not containing impurities in a substantial proportion provided that the aromatic type products predominate in the bulk of the mixture.

NOTE — It is not usual to include in this expression certain pure hydrocarbons of the aromatic series which, although they exist in crude benzole or in certain have fractions, are mainly obtained by synthesis (for example, iso-propylbenzene).

Benzole, Crude — The product recovered by scrubbing coal carbonization gases with wash oil (petroleum or tar based). It consists essentially of benzene and its homologues together with saturated and unsaturated hydrocarbons, sulphur compounds and other minor constituents. Pyridine bases and phenols may also be present in some cases.

Benzole Forerunnings — See ‘Distillation Fronts’.

Benzole, Industrial — The material recovered by fractionation and refining of crude benzole, usually boiling at about 100°C.

Benzole, Motor — Mixture of hydro carbons intended
for use in a motor fuel is appropriate.

**Benzole Stripping** — Treatment of coal gas or gas obtained from the process of coal carbonization with the object of extracting all or a part of its benzole content.

**Benzolized Gas** — See ‘Unstripped Gas’.

**Black End** — Part of a charge incompletely carbonized as a result of its position in or near the mouthpiece of a horizontal retort, or the door of a coke oven.

**Blast Furnace Coke** — See ‘Metallurgical Coke’.

**Blocks Coke** — Coke which may be broken most readily into approximately cubic pieces.

**Carbolic Acid** — A mixture of monohydric phenols of substantial phenol content.

**Carbolic Oil (Middle Oil)** — It is coal tar fraction with a distillation range of 199°C-271°C containing mainly naphthalene, phenol and cresols.

**Carbonization** — Operation consisting of the treatment of coal by heat in a closed chamber/retort in the absence of air, usually with the object of producing coke or gas.

**Carbonization, High Temperature** — The coke mass temperature is kept around 900°C-1100°C. The process is used to prepare blast furnace coke.

**Carbonization, Low Temperature** — Carbonization carried out generally at a coke mass temperature between 450°C to 700°C. The process is used to prepare smokeless fuels.

**Carbonization, Medium Temperature** — Carbonization carried out generally at a coke mass temperature between 700°C and 900°C.

**Char** — Solid enriched carbon product obtained by low temperature carbonization of solid carbonaceous material or by fluidized bed carbonization process.

**Coal Gas** — It is the mixture of volatile products (mainly hydrogen, methane, CO and nitrogen) remaining after removal of water and tar, obtained from carbonization of coal having a heat content of 14,904 to 22,356 kJ/l.

**Coal Tar Oil, Light** — The product usually distills between 60°C and 180°C.

**Coal Tar Paint** — Black paint based on coal tar.

**Coal Breeze** — The finer sizes of coke below 6 mm obtained by screening.

**Coke Oven Gas** — It is a bye product fuel gas, derived from coking coals by the process of carbonization.

**Coke Oven Gas, Rion** — Coke oven gas from which benzole hydrocarbon have not been stripped off.

**Coke, Run-of-Chamber** — Coke from a chamber, oven or retort before undergoing any screening or other preparation.

**Coke, Run-or-Oven** — Coke from a chamber, oven or retort before undergoing any screening or other preparation.

**Coke, Run-of-Retort** — Coke from a chamber, oven or retort before undergoing any screening or other preparation.

**Creosote Oil** — The oil or a blend of oils obtained from coal tar and distilling between 230°C and 300°C. The term ‘creosote oil’ should always be associated with an indication of the type of coal tar from which the oil has been produced, for example, high temperature coal tar creosote oil.

**Creosotes** — Creude or processed heavy fractions of coal tar blended suitably to comply with the specification.

**Cresols** — The tar acids mostly methylphenols obtained by fractional distillation of carbolic acid recovered from coal tar having a crystallizing point below 20°C and building up to 205°C.

**Cresylic Acid** — A mixture of monohydric phenols, essentially cresols and higher homologues.

**Cresylic Acid, Refined** — A mixture of monohydric phenols, consisting essentially of cresols, with or without xylenols and with or without a small portion of phenol.

**Cresylic Creosote** — Creosote oil containing substantial amounts of phenols and usually conforming to a specification, especially in regard to its phenols content. It may be obtained directly by the distillation of coal tar, or it may be an oil in which the proportion of phenols has been adjusted to comply with the specification.

**Crude Gas** — A mixture of gases resulting from the removal of all or nearly all the tar and most of the water vapour from raw gas by condensation.

**Debenzolized Gas** — See ‘Stripped gas’.

**Dephenolation** — Removing phenols from coal tar distillate or distillate fractions or an aqueous liquid (such as ammoniacal liquor) or from a vapour, by suitable physical or chemical method with a suitable agent (such as activated carbon, benzole, creosote or sodium hydroxide solution).

**Distillation Fronts** — The first fraction obtained from the distillation of crude benzole. This fraction usually distills below about 65°C.
NOTE — It contains most of the light impurities from the crudes benzole as well as carbon disulphide and cyclopentadiene.

**Distillation Tails (Residue)** — Products distillation above 200°C.

NOTE — They may contain such impurities as naphthalene, phenol, pyridine bases and also a small proportion of benzole absorbing oil of the crude benzole and some resin-forming products. They are often coloured.

**F**

**Foul Gas** — See ‘Crude Gas’.

**Foundry Coke** — Hard cokе of size 60 mm depending on the internal diameter of cupula, suitable for use in foundry cupola melting furnaces.

**Fuels, Coal Tar** — Coal tar products ranging from creosote to hard pitch, which may be liquid or solid at ordinary temperatures and conforming to specification which define their applicability as fuels. A coal tar fuel is designated by a number representing approximately the temperature in Fahrenheit at which the viscosity is 100 seconds on the No. 1. Redwood viscometer. This is the viscosity at which the fuel may be atomized satisfactorily. The normal grades are CTF 50, 100, 200, 250, 300 and 400. The grades CTF 200 and above are pitch creosotes.

NOTE — The CTF designation numbers are at present related to Fahrenheit scale of temperature and would be amended when industry adopts designation numbers related to the celsius scale.

**Fuel Pulverizable, Coal Tar** — Coal tar pitch of suitable high softening point so that it is non-agglomerating when stored in powdered form at normal air temperatures.

**G**

**Gas Coke** — The solid residue from the distillation of coals of high volatile content at high temperature in gas making retorts.

**Gas Liquor, Concentrated** — An aqueous solution of ammonia (10 to 20 percent) and ammonia salts, such as carbonate and sulphide, produced by distilling ammoniacal liquor.

**Graded Coke** — See ‘Sized Coke’.

**Green Gas** — See ‘Raw Gas’.

**Green Oil** — See ‘Anthracene Oil’.

**Gum** — Non-volatile resinous products of high molecular mass derived from the oxidation, condensation and polymerization of unsaturated hydrocarbon present in the aromatic hydrocarbons found in the gas stream or in the liquid stream.

NOTE — The characteristics attributed to different types of gum from benzoles are closely related to the methods used for their determination. For this, among a number of reasons, the same terms may have different significance in other sectors (such as petroleum).

**Gum, Existent** — The residue from the evaporation of hydrocarbons during the specified test.

**Gum, Potential** — The gum which is not contained in the hydrocarbon at the moment of the test but which may be formed later if the product is placed under conditions which induce the resinification of unstable constituents.

NOTE — Potential gum is actually equal to the different between total gum and existent gum.

**Gum, Total** — The residue from the evaporation of hydrocarbons after, promoting, in specified conditions, the resinification of all unsaturated constituents which may be converted into gum.

**H**

**Hard Coke** — A comprehensive term which includes metallurgical and foundry coke and also certain types of domestic coke.

**Heating Gas** — Gas supplied for heating.

**Heavy Oil** — A heavy coal tar fraction with distillation range usually 249°C-299°C containing naphthalene and coal tar bases.

**I**

**Inerts** — Constituents of a solid, liquid or gaseous fuel which do not contribute to its calorific value. The usual inerts in a solid fuel are moisture and mineral matter and in gaseous fuels carbon dioxide, oxygen, nitrogen, etc.

**Insoluble Matter** — The solid carbonaceous matter remaining after the extraction of coal tar or pitch with pure benzene, toluene, quinoline or certain other solvents.

**L**

**Lead Gas** — Gas of relatively low calorific value.

**Low Temperature Sprit, Crude** — A crude product extracted from the gas of the tar obtained by low temperature carbonization of coal and having a relative density at 27°C/27°C between 0.790 to 0.850. The product normally contains larger proportions of paraffins, naphthenes and unsaturated hydrocarbons than crude benzole.

**M**

**Metallurgical Coke** — This typically contains 85-88 percent fused carbon, 9 to 11 percent ash and 2 percent volatiles.
N

Naphtha, Heavy (Coal Tar Solvent Naphtha) — A fraction of light oil or of crude benzole conforming to a specification and distilling substantially between 160°C and 190°C.

Naphthalene, Crude — The solid product, consisting essentially of naphthalene, obtained on cooling crude intermediate fractions (205°C to 235°C) from the distillation of coal tar. Crude naphthalene is sometimes obtained during the purification of coal gas.

Naphthalene, Hot-Pressed — Crude naphthalene generally processed in a heated hydraulic or screw press and having a crystallizing point generally not below 77.5°C. Naphthalene of similar quality produced by other means is also known in the trade as hot-pressed naphthalene.

Naphthalene Oils — A coal tar creosote oil distilling substantially in the range of 206°C to 235°C and containing a commercial quantity of recoverable naphthalene.

Naphthalene, Refined — A white solid consisting essentially of naphthalene, melting to a colourless liquid and having a crystallizing point not below than 79.4°C.

Naphtha, Solvent — A product consisting essentially of the xylenes together with their homologues and conforming to a specification.

Neutral Oil — Carbolic oils from which phenols have been removed.

P

Pan Breeze — Coke breeze recovered from producer ashes.

Pan Coke — Coke recovered from producer ashes.

Phenol — Synonymous with monohydroxybenzene.

Phenols, Coal Tar — The mixture of those constituents of coal tar or of coal tar fractions which are reacted with and remain soluble in aqueous sodium hydroxide solution. The mixture consists of monohydric, dihydric or other higher homologues of phenols.

Phenols, High Boiling — Synonymous with high boiling tar acids.

Pitch, Coal Tar — The black or dark brown solid or semi-solid fusible and agglomerative residue remaining after partial evaporation or fractional distillation of coal tars. They are usually graded on the basis of their softening points as soft, soft medium, hard medium, hard, extra hard, etc.

Pitch Coke — Coke obtained by carbonization of suitable processed coal tar pitch.

R

Raw Gas — A mixture of permanent gases, vapours and tar fog evolved from coal during carbonization.

Retort Carbon — A layer of carbon formed on the inner surfaces of high temperature carbonizing vessels by decomposition of hydrocarbons during carbonization. It is periodically removed by allowing air to pass over the carbon on the hot retort or even surfaces. This operation is termed as scurfing or scaling.

Rich Gas — Gas of relatively high calorific value consisting mainly of lower gaseous hydrocarbons.

Road Tar — High temperature tar treated to make it suitable for surfacing or dressing of roads.

S

Scaling — Operation of periodical removal of the layer of carbon formed on the inner surfaces of high temperature carbonizing vessels by allowing air to pass over it.

Scurfing — See ‘Scaling’.

Sized Coke — Coke in lumps, of sizes between specified limits obtained by screening.

Soft Coke — Coke obtained by low temperature carbonization of coal and also by partial combustion in open air.

Stripped Gas — Gas from which benzole has been removed.

T

Tar — A viscous material having adhesive properties and resulting from the destructive distillation of organic material. The word ‘tar’ should be preceded by the name of the material from which it is produced for example coal, shale, peat, vegetable matter, etc, and its mode of production should also be indicated.

Tar Acids — A mixture of constituents of coal tar or coal tar fractions extractable with aqueous caustic soda and springing by acids and consisting mainly of monohydric phenols.

Tar Acids, High Boiling — Mixture of tar acids boiling mostly above 230°C.

Tar Coal — Tar produced by the carbonization of coal.

Tar, Coke Oven — Coal tar produced as a by-product
at coke oven plant during the manufacture of coke from bituminous coal.

**Tar, Dolomite** — A special grade of processed tar used as a binder for the manufacture of dolomite brick.

**Tar, High Temperature** — Obtained as a by-product in the high temperature carbonization of coal.

**Tar, Low Temperature** — Obtained as a by-product in the low temperature carbonization of coal.

**Tar, Refined** — Tar from which water and the more volatile oils have been removed by distillation.

**Toluole, Industrial** — The material obtained by fractionation and refining of crude benzole, usually boiling at about 110°C, mainly consisting of toluene (methyl benzene).

**Town Gas** — It is a gaseous mixture of coal gas and carbureted water gas manufactured from coal with a heat content of 22,356 kJ/l.

**Tar, Refined** — Tar from which water and the more volatile oils have been removed by distillation.

**Wash Oil (Benzole Absorbing Oil)** — A high temperature coal tar creosote oil distilling substantially between 200°C and 300°C used for benzole stripping. Also applied to a petroleum fraction distilling substantially between 250°C and 370°C.

**Xylenols** — A mixture of tar acids consisting essentially of dimethyl phenols obtained by distillation after recovery of phenols and cresols.

**Xylole, Industrial** — The material obtained by fractionation and refining of crude benzole, usually boiling in the range of 135°C to 142°C, mainly consisting of xylenes (dimethyl benzenes).
ANNEX A
(Foreword)

COMMITTEE COMPOSITION

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Building Materials & Technology Promotion Council, New Delhi

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This Indian Standard has been developed from Doc : No. PCD 6 (425).

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Printed at Prabhat Offset Press, New Delhi-2