



Coal Tar

- Coal Tar is a liquid in its natural form
- Therefore, it is measured in mL (unless otherwise stated)
- Although it's a liquid, it's often incorporated in formulae by weight (grams)
- 1mL of coal tar weighs 1.15g
 - referred to as density i.e. 1.15g/mL

Note: the value for the density of coal tar may change based on the elements contained within



Coal Tar

Martindale: Coal Tar

Synonyms: **Crude Coal Tar**; Oleum Lithanthracis; **Pix Carbon.**; **Pix Carbonis**; Pix Lithanthracis; Pix Mineralis; etc

BP 2014 (Coal Tar). A product obtained by the destructive distillation of bituminous coal at a temperature of about 1000 degrees. **A nearly black, viscous liquid** with a strong characteristic penetrating odour. **On exposure to air it gradually becomes more viscous.** It burns in air with a luminous sooty flame. Slightly soluble in water; partly soluble in absolute alcohol, in chloroform, in ether, and in volatile oils. A saturated solution is alkaline to litmus.

USP 36 (Coal Tar). The tar obtained by the destructive distillation of bituminous coal at temperatures in the range of 900 degrees to 1100 degrees. It may be processed further either by extraction with alcohol and suitable dispersing agents and maceration times or by fractional distillation with or without the use of suitable organic solvents.

A nearly black, viscous liquid with a characteristic naphthalene-like odour. Slightly soluble in water to which it imparts an alkaline reaction; partially soluble in alcohol, in acetone, in carbon disulfide, in chloroform, in ether, in methyl alcohol, and in petroleum spirit; more soluble in benzene; almost completely soluble in nitrobenzene. Store in airtight containers.



Coal Tar Solution = LPC

➤ In pharmaceutical preparations we use coal tar prepared in a solution and made according to the formulation in the APF:

➤ Coal Tar Solution APF

➤ Coal Tar.....20g

➤ Polysorbate 80.....5g

➤ Ethanol (90%v/v).....to 100mL

➤ So, coal tar solution is 20%w/v coal tar

➤ Alcoholic solutions of coal tar,

or prepared coal tar with the aid of polysorbate,

are also referred to as

Liquor Picis Carbonis (LPC) and

Liquor Carbonis Detergen





Coal Tar Solution = LPC

- LPC is a liquid
- LPC is measured in mL (unless otherwise stated)
- LPC according to its APF formula contains 20% coal tar ie **100mL of LPC contains 20g of crude coal tar**
- The density of coal tar solution (LPC) 0.89g/mL

(note the different densities for coal tar and coal tar solution)

Note: the values for the density of coal tar liquid may change based on the elements contained within

- Coal tar solution can stain skin, fair hair and clothing
- Avoid broken or inflamed skin
- Avoid eyes and mucous membranes
- FOR EXTERNAL USE ONLY



Conversions: Coal Tar and LPC

Example 1

Script for: 1% Coal Tar in aqueous cream, supply: 50g

➤ Formula:	Quantity required (50g)
➤ Coal tar..... 1mL	0.5mL
➤ Aqueous cream..... to 100g	to 50g

➤ Coal Tar is a liquid in its natural form and is measured in mL

1mL is known to weigh 1.15g (density = 1.15g/mL), so 0.5mL weighs **0.575g**

But we only have LPC:

LPC is 20%w/v coal tar i.e. 20g coal tar per 100mL

We need **0.575g** of coal tar which can be found in x mL of LPC

$$x = 0.575 \times 100/20 \quad x = \mathbf{2.875\text{mL} (= 2.9\text{mL}) \text{ of LPC}}$$



Conversions: Coal Tar and LPC

- To calculate the amount of base that needs to be weighed, we need to convert the volume of coal tar solution into weight using the density
- The density of coal tar solution is 0.89g/mL
i.e. 1mL coal tar solution weighs 0.89g
- So, for 2.9mL:
 $2.9 \times 0.89 = 2.581\text{g}$

which is subtracted from the amount of the final product weight to give the amount of base required:

$$= 50\text{g} - 2.581\text{g} = 47.419\text{g of base (aqueous cream)}$$



Example 2

Conversions: Coal Tar and LPC

Script for: Zinc and coal tar ointment APF, supply: 50g

➤ APF Formula	Quantity Required (50g)
➤ Zinc Oxide.....20g	10g
➤ Coal Tar.....5g	2.5g
➤ Castor Oil.....3g	1.5g
➤ White Soft Paraffin.....72g	36g

Here, the formula specifies coal tar as a weight

But we only have LPC:

LPC is 20g coal tar per 100mL

We need **2.5g** of coal tar which can be found in x mL of LPC

$$x = 2.5 \times 100/20 \quad x = \mathbf{12.5\text{mL of LPC}}$$



Conversions: Coal Tar and LPC

- To calculate the amount of base that needs to be weighed, we need to convert the volume of coal tar solution into weight using the density
- The density of coal tar solution is 0.89g/ml
i.e. 1mL coal tar solution weighs 0.89g
- So, for **12.5mL**:
 $12.5 \times 0.89 = 11.125\text{g}$

which is subtracted from the amount of the final product weight to give the amount of base required:

$$\begin{aligned} &= 50\text{g} - (11.125\text{g (coal tar sol)} + 10\text{g (ZnO)} + 1.5\text{g (castor oil)}) \\ &= 50 - 22.625 \qquad = 27.375\text{g of base (white soft paraffin)} \end{aligned}$$



Conversions: Coal Tar and LPC

Example 3

Script for Salicylic acid and coal tar ointment APF, supply: 50g

➤ APF Formula:	Quantity Required (50g)
➤ Salicylic acid.....3g	1.5g
➤ Coal Tar solution.....6mL	3mL
➤ White Soft Paraffin.....50g	25g
➤ Emulsifying ointment.....41g	20.5g

Here, the formula specifies coal tar liquid, which we have – so no calculation for coal tar is required, only to calculate the amount of base required



Conversions: Coal Tar and LPC

- To calculate the amount of base that needs to be weighed, we need to convert the volume of coal tar solution into weight using the density
- The density of coal tar solution is 0.89g/ml
i.e. 1mL coal tar solution weighs 0.89g
- So, for **3mL**:
 $3 \times 0.89 = 2.67\text{g}$

which is subtracted from the amount of the final product weight to give the amount of base required:

$$\begin{aligned} &= 50\text{g} - (2.670\text{g} + 1.5\text{g (AcSal)} + 25\text{g (WSP)}) \\ &= 50 - 29.17 \qquad \qquad \qquad = 20.830\text{g of base (emulsifying ointment)} \end{aligned}$$



Conversions: Coal Tar and LPC

Example 4

Script for: 1% LPC in aqueous cream, supply: 50g

Which is coal tar solution 1%v/w in aqueous cream

- | Formula: | Quantity required (50g) |
|-----------------------------------|-------------------------|
| ➤ Coal tar solution (LPC).....1mL | 0.5mL |
| ➤ Aqueous cream..... to 100g | to 50g |
- Here, the formula specifies LPC = coal tar liquid, which we have – so no calculation for coal tar is required, only to calculate the amount of base required



Conversions: Coal Tar and LPC

- To calculate the amount of base that needs to be weighed, we need to convert the volume of coal tar solution into weight using the density
- The density of coal tar solution is 0.89g/ml
i.e. 1mL coal tar solution weighs 0.89g
- So, for **0.5mL**:
 $0.5 \times 0.89 = 0.445\text{g}$
which is subtracted from the amount of the final product weight to give the amount of base required:
 $= 50\text{g} - 0.445\text{g} = 49.555\text{g}$ of base (aqueous cream)