



>>Entry Name: Arsenic

CAS Registry Number: 7440-38-2

Related CAS Registry Numbers(s): 17428-41-0 22541-54-4 22856-08-2 23878-46-8 51680-82-1

Extra CAS Registry Numbers(s): 12187-08-5

As

Molecular Formula: As

Molecular Weight: 74.922

Accurate Mass: 74.921594

Percentage Composition: As 100.00%

General Statement: Atomic No. 33. Ground state electron config. $[\text{Ar}]3d^{10}4s^24p^3$. 14 Isotopes have been reported of which only ^{75}As is natural and stable. The element may have been isol. by Albertus Magnus (1193-1280), but compds. known for many centuries previously. Abundance: 1.8 ppm (earth's crust); 0.003 ppm (sea water)

Source/Synthesis: Occurs in coal (1-1500 ppm), petroleum (0.001-0.15 ppm), oil shale ($\rightarrow$ 50 ppm) and throughout earth's crust (*ca.* 5 ppm). Also occurs widely as the sulfides, and as the oxide, as well as arsenides of many metals. Obt. from flue dusts from smelting of Cu and Pb concentrates, and by heating arsenides e.g. FeAs_2 , and sulfides e.g. FeAsS to 700° .

Use/Importance: Used as alloys with Pb or Cu. Compds. widely used in agriculture as herbicides, wood preservatives, sheep and cattle dips, and also in the glass and electronics industries. More recently, employed in superconductors

Other Data: Not readily attacked by H_2O , $\text{OH}^{(-)}$ or non-oxidising acids. Stable in dry air, but surface oxidises in moist air. Dil. $\text{HNO}_3 \rightarrow \text{H}_3\text{AsO}_3$; conc. $\text{HNO}_3 \rightarrow$ Arsenic acid [HTG94-I](#). Hot, conc. $\text{H}_2\text{SO}_4 \rightarrow$ Arsenic oxide (As_2O_3) [HTH50-X](#) and Arsenic oxide (As_4O_6) [HTH71-E](#). Fused $\text{NaOH} \rightarrow \text{Na}_3\text{AsO}_3 + \text{H}_2$. Ignition in air $\rightarrow$ Arsenic oxide (As_2O_3) [HTH50-X](#), Arsenic oxide (As_4O_6) [HTH71-E](#), Arsenic oxide (As_2O_5) [HTH52-Z](#). In vapour, $\text{As}_4 \rightarrow \text{As}_2$ at 800°

Aldrich: 20265-7

Fluka: 11080

>>Variant: α -form

Molecular Formula: As

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General Statement: Hexagonal lattice. Consists of puckered sheets of covalently bonded atoms of coordn. no. 3 with As-As 251.7 pm, AsAsAs 96.7° , (3 neighbours). As-As 312.0 pm (3 next nearest neighbours)

Physical Description: Steel-grey, brittle, stable, "metallic" form

Melting Point: Mp 816° (38.6 atm.)

Boiling Point: Subl. 615°

Other Data: d^{26} 5.78 g cm^{-3}

>>Variant: Yellow cryst.-form

Molecular Formula: As

Molecular Weight: 74.922

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Percentage Composition: As 100.00%

General Statement: Cubic lattice containing As_4 molecules

Source/Synthesis: Synth. by sublimation

Other Data: d^{25} 1.97 g cm^{-3}

>>Variant: β -form

Molecular Formula: As

Molecular Weight: 74.922

Accurate Mass: 74.921594

Percentage Composition: As 100.00%

Source/Synthesis: From As vapour at 200°

Physical Description: Amorphous mirror-like arsenic

>>Variant: γ -form

Molecular Formula: As

Molecular Weight: 74.922

Accurate Mass: 74.921594

Percentage Composition: As 100.00%

Source/Synthesis: From As vapour at 100° or by reduction of H_2O sol. As(*III*) compds.

Physical Description: Grey-black amorphous solid but also exists in other colours