Detection of elements and functional groups

Formulas and units, JEE Main. Status: Reviewed on 2026-11-20.

Result	Formula	Units or note
Sodium fusion (N)	Na + C + N gives NaCN Valid when: Lassaigne extract; nitrogen present, no sulphur, sodium in excess	sodium cyanide in extract
Sodium fusion (S)	2Na + S gives Na2S Valid when: Lassaigne extract; sulphur present	sodium sulphide in extract
Sodium fusion (N and S)	Na + C + N + S gives NaSCN Valid when: N and S both present with limited sodium	thiocyanate, blood red with Fe3+
Nitrogen test	3[Fe(CN)6]4- + 4Fe3+ gives Fe4[Fe(CN)6]3 Valid when: extract boiled with FeSO4, then Fe3+ added and acidified; cyanide present	Prussian blue
Sulphur tests	S2- + nitroprusside: violet; S2- + Pb2+: black PbS	n/a (colour)
Halogen tests (after HNO3)	AgCl white, soluble dil NH3; AgBr pale yellow, conc NH3; AgI yellow, insoluble Valid when: extract boiled with HNO3 first to remove CN- and S2-	precipitate colour
Alcohol classes (Lucas)	tertiary: at once; secondary: about 5 min; primary: none	n/a (time to turbidity)
Carbonyl tests	2,4-DNP: all C=O; Tollens: CHO; Fehling: aliphatic CHO; iodoform: CH3CO-R, CH3CH(OH)-R	precipitate or mirror
Acid and phenol tests	COOH + NaHCO3 gives CO2; phenol + neutral FeCl3 gives violet	gas, colour
Amine tests	RNH2 + CHCl3 + KOH: carbylamine; ArNH2 + HNO2, then 2-naphthol: orange-red dye Valid when: RNH2 aliphatic or aromatic for carbylamine; azo dye needs primary aromatic amine, cold	smell, dye colour

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/principles-related-to-practical-chemistry/detection-of-elements-and-fur

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