

AP Chemistry: Colors

Flame Test Colors

Li ⁺	Deep red (crimson)
Na ⁺	Yellow
K ⁺	Violet
Ca ²⁺	Orange-red
Sr ²⁺	Red
Ba ²⁺	Yellow-green
Cu ²⁺	Blue-green

Aqueous Ion Colors

Cu ¹⁺	Green
Cu ²⁺	Blue
Fe	Yellow to red-orange (depending on anion and charge of Fe); in rare cases, can form complex ion with a deep blue color
Fe ²⁺	yellow-green (depending on the anion)
Fe ³⁺	orange-red (depending on the anion)
Cr ³⁺	Violet (Cr(NO ₃) ₃) to Green (CrCl ₃)
Ni ²⁺	Green
Mn ²⁺	Pink
MnO ₄ ⁻	Purple (Mn w/ +7 oxidation state is purple)
Pb ³⁺	blue-green (Pb ²⁺ and Pb ⁴⁺ are colorless)
V ²⁺	violet
V ³⁺	blue-green
CrO ₄ ²⁻	Yellow
Cr ₂ O ₇ ²⁻	Orange
Cu(NH ₃) ₄ ²⁺	Dark Blue; produced when ammonia is added to Cu ²⁺ solutions
FeSCN ²⁺	Red-brown, Wine-red to dark orange
CoCl ₄ ²⁻	Blue (Co ²⁺ with HCl will form a CoCl ₄ ²⁻ complex that is blue)
Co ²⁺	Pink
Ti(H ₂ O) ₆ ³⁺	Purple

- Al, K, Li, Mg, Na, Ca, Ba, Sr, Zn are colorless aqueous ions and most of their solid salts are white.
- Transition element ions with partially filled *d* orbitals tend to release colored light.

Assorted Compounds

F ₂	Pale-yellow gas
Cl ₂	Green-yellow gas
Br ₂	Red-brown liquid
I ₂	Dark-violet vapor & dark metallic looking solid
S ₈	Yellow, odorous solid
NO	Colorless gas; associated with reactions between metals and dilute HNO ₃
NO ₂	Brown gas; associated with reactions between metals and concentrated HNO ₃
PbI ₂	Bright yellow precipitate
Metallic sulfides	Sulfides of transition metals tend to be black
Fe ₂ O ₃	Reddish brown (rust)
Metallic oxides	Oxides of colored transition metal ions tend to be colored

Acid-Base Indicators

Phenolphthalein	Colorless (pH<7) to Pink (pH>8 ; when OH ⁻ is present)
Red Litmus (paper)	Turns purple-ish blue in alkaline solution
Blue Litmus (paper)	Turns pink-ish red in acidic solution