EngineeringRise

Salt analysis and thermochemical experiments

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

Result	Formula	Units or note
Heat absorbed	q = (m c + C) x dT Valid when: no heat loss to surroundings; c and C constant; dT small	J (c in J g^-1 K^-1, C in J K^-1)
Enthalpy from calorimetry	dH = -q / n (heat released when dT > 0) Valid when: constant pressure; n = moles of water formed (limiting reagent)	kJ per mole
Strong acid with strong base	H+ + OH- gives H2O, about -57 kJ per mole Valid when: dilute strong acid with dilute strong base, about 298 K	kJ per mole
Ionisation enthalpy of a weak acid	dH(ion) = dH(neut, strong) - dH(neut, weak) Valid when: weak acid fully neutralised by strong base, same conditions as strong acid value	kJ per mole
Cation groups	I Pb2+; II Cu2+, Pb2+; III Al3+, Fe3+; IV Zn2+, Ni2+; V Ca2+, Ba2+; VI Mg2+; zero NH4+	group
Group reagents	dil HCl; H2S + dil HCl; NH4Cl + NH4OH; H2S + NH4OH; (NH4)2CO3	in this order
Dilute-acid anions	CO3 2-: CO2; S2-: H2S; NO2-: NO2	gas evolved
Concentrated-acid anions	Cl-: HCl; Br-: brown Br2; I-: violet I2; NO3-: brown NO2	n/a (vapour colour)
Clock reaction rate	rate = (n(S2O3 2-)/2) / (V x t); rate = k[H2O2][I-] Valid when: thiosulphate consumed fully at blue colour; concentrations nearly constant; first order each	mol L^-1 s^-1 (k in L mol^-1 s^-1)
Hess cycle for hydration	dH(hydration) = dH(sol, anhydrous) - dH(sol, hydrate) Valid when: same amount of salt dissolving to the same final solution	kJ per mole

Full lesson with worked examples:
https://www.engineeringrise.in/learn/learn/jee-main/chemistry/principles-related-to-practical-chemistry/salt-analysis-and-thermochem

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