

Acid-Base Properties of Ions

Neutral Ions	Acidic Ions	Basic Ions
Cations of the alkali and alkaline earth metals (e.g. Na^+ , K^+ , Ca^{2+})	Cations of the transition metals (e.g. Fe^{3+} , Co^{2+} , Mn^{4+})	Conjugate bases of weak acids (e.g. F^- , CH_3CO_2^- , CN^-)
Conjugate bases of monoprotic strong acids (e.g. Cl^- , Br^- , NO_3^-)	Conjugate acids of weak bases (e.g. NH_4^+ , CH_3NH_3^+)	

K_a Values for Some Common Weak Acids

Weak Acid	K_{a1}
H_3PO_4 (phosphoric)	7.5×10^{-3}
HF (hydrofluoric)	6.8×10^{-4}
HNO_2 (nitrous)	4.5×10^{-4}
HCO_2H (formic)	1.8×10^{-4}
$\text{CH}_3\text{CO}_2\text{H}$ (acetic)	1.8×10^{-5}
H_2CO_3 (carbonic)	4.3×10^{-7}
HClO (hypochlorous)	3.0×10^{-8}
NH_4^+ (ammonium ion)	5.6×10^{-10}
HCN (hydrocyanic)	4.9×10^{-10}
CH_3NH_3^+ (methylammonium ion)	2.3×10^{-11}

1. Predict whether the following aqueous solutions would be acidic, basic, or neutral. Explain each of your answers.

a) 0.10 M NH_4Br _____

b) 0.05 M $\text{Ca}(\text{HCO}_3)_2$ _____

c) 0.20 M H_3PO_4 _____

d) 0.15 M $\text{Ca}(\text{NO}_2)_2$ _____

e) 0.15 M $\text{Ca}(\text{NO}_3)_2$ _____

2. Predict whether a solution of NH_4CN will be acidic, basic, or neutral. Explain.