

Chem 135: Results Table for Practical Number 3 – Anions & Cations

Key: 01-2012

Use one table row for each test carried out. (E.g. test of sample 1 with silver nitrate.) Carry out all confirmatory tests.

Total marks 89

Sample #	TEST (Errors may earn negative marks.)	OBSERVATIONS (1 mark each relevant observation)	INFERENCES AND IONIC EQUATIONS (1 mark for each inference which explains an observation. Only fully balanced equations can earn marks. Irrelevant or incorrect equations may earn negative marks.)
A	NaOH(aq)	No ppt. No action on warming. (2)	
A	Flame test	Lilac flame. Crimson through blue glass. (2)	K^+ present. (1)
A	BaCl ₂ (aq) added.	No ppt. (1)	
A	AgNO ₃ (aq) added.	Cream ppt. insol. in dil. NH ₃ (aq), sol. in conc. NH ₃ (aq). (3)	Br ⁻ present $Ag^+(aq) + Br^-(aq) \rightarrow AgBr(s)$ (1) $AgBr(s) + 2NH_3(aq) \rightarrow [Ag(NH_3)_2]^+(aq) + Br^-(aq)$ (1)
B	NaOH(aq) added.	Green (or blue) ppt. insol. in xs. Ppt. turns brown. (3)	Fe ²⁺ present $Fe^{2+}(aq) + 2OH^-(aq) \rightarrow Fe(OH)_2(s)$ (1) $4Fe(OH)_2(s) + O_2(g) + 2H_2O(l) \rightarrow 4Fe(OH)_3(s)$ (1)
B	NH ₃ (aq) added	Green (or blue) ppt. insol. in xs. Ppt. turns brown. (3)	$Fe^{2+}(aq) + 2OH^-(aq) \rightarrow Fe(OH)_2(s)$ (1) $4Fe(OH)_2(s) + O_2(g) + 2H_2O(l) \rightarrow 4Fe(OH)_3(s)$ (1)
B	BaCl ₂ (aq) added.	White ppt. insol. in dil. strong acid. (2)	SO ₄ ²⁻ present. $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$ (1)
C	NaOH(aq) added	No ppt. No action on warming. (2)	
C	Flame test	Persistent yellow flame, invisible through blue glass. (2)	Na ⁺ present. (1)
C	BaCl ₂ (aq) added.	White ppt. soluble in dil. strong acid. Gas liberated which turns limewater milky and then clear. (5)	$Ba^{2+}(aq) + CO_3^{2-}(aq) \rightarrow BaCO_3(s)$ (1) $BaCO_3(s) + 2H^+(aq) \rightarrow Ba^{2+}(aq) + H_2O(l) + CO_2(g)$ (1) $CO_2(g) + 2OH^-(aq) + Ca^{2+}(aq) \rightarrow CaCO_3(s) + H_2O(l)$ (1) $2CO_2(g) + Ca(OH)_2(s) \rightarrow Ca^{2+}(aq) + 2HCO_3^-(aq)$ (1)
C	MgCl ₂ (aq) added.	White ppt. on warming (1)	HCO ₃ ⁻ present $Mg^{2+}(aq) + CO_3^{2-}(aq) \rightarrow MgCO_3(s)$ (1)

Sample #	TEST (Errors may earn negative marks.)	OBSERVATIONS (1 mark each relevant observation)	INFERENCES AND IONIC EQUATIONS (1 mark for each inference which explains an observation. Only fully balanced equations can earn marks. Irrelevant or incorrect equations may earn negative marks.)
D	NaOH(aq) added	Blue ppt. insol. in xs. (2)	Cu ²⁺ present. Cu ²⁺ (aq) + 2OH ⁻ (aq) → Cu(OH) ₂ (s) (1)
D	NH ₃ (aq) added	Blue ppt. sol. in xs. to form deep blue soln. (3)	Cu ²⁺ (aq) + 2OH ⁻ (aq) → Cu(OH) ₂ (s) (1) Cu(OH) ₂ (s) + 4NH ₃ (aq) → [Cu(NH ₃) ₄] ²⁺ (aq) + 2OH ⁻ (aq) (1)
D	AgNO ₃ (aq)	White ppt. sol. in dil. NH ₃ (aq) (2)	Ag ⁺ (aq) + Cl ⁻ (aq) → AgCl(s) (1) AgCl(s) + 2NH ₃ (aq) → [Ag(NH ₃) ₂] ⁺ (aq) + Cl ⁻ (aq) (1)
E	NaOH(aq) added	White ppt. soluble in xs (2)	Zn ²⁺ present. Zn ²⁺ (aq) + 2OH ⁻ (aq) → Zn(OH) ₂ (s) (1) Zn(OH) ₂ (s) + 2OH ⁻ (aq) → [Zn(OH) ₄] ²⁻ (aq) (1)
E	NH ₃ (aq) added	White ppt. soluble in xs. (2)	Zn ²⁺ (aq) + 2OH ⁻ (aq) → Zn(OH) ₂ (s) (1) Zn(OH) ₂ (s) + 4NH ₃ (aq) → [Zn(NH ₃) ₄] ²⁺ (aq) + 2OH ⁻ (aq) (1)
E	BaCl ₂ (aq) added.	No ppt. (1)	
E	AgNO ₃ (aq)	No ppt. (1)	
E	Devarda's alloy test.	No ammonia detected on addn. of NaOH(aq). On addn. of metal, gas turns red litmus blue, forms white smoke when exposed to HCl(g) (4)	NH ₄ ⁺ absent. 2Al(s) + 2OH ⁻ (aq) + 6H ₂ O(l) → 2[Al(OH) ₄] ⁻ (aq) + 3H ₂ (g) (1) 3NO ₃ ⁻ (aq) + 18H ₂ O(l) + 8Al(s) + 5OH ⁻ (aq) → 3NH ₃ (aq) + 8[Al(OH) ₄] ⁻ (aq) (1) NH ₃ (g) + HCl(g) → NH ₄ Cl(s) (1)

Sample Number	Identity	
	formula	name
A	KBr (2)	potassium bromide (2)
B	FeSO ₄ (2)	iron(II) sulfate (2)
C	NaHCO ₃ (2)	sodium hydrogencarbonate (2)
D	CuCl ₂ (2)	copper(II) chloride (2)
E	Zn(NO ₃) ₂ (2)	zinc nitrate (2)