

Nitrogen and its compounds

1. (i) $4\text{HN}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 4\text{NO}(\text{g}) + 6\text{H}_2\text{O}(\text{g})$
 (ii) Act as catalyst
 (iii) $\text{Zn}(\text{NH}_3)_4^{2+}$
2. a) Platinum/ copper
 b) Brown fumes ✓
 Hot rod continues to glow red
 - NO formed reacts with oxygen to form NO_2 (brown fumes)
 - Reaction highly exothermic
3. a) Calcium hydroxide
 b) $\text{Ca}(\text{OH})_2(\text{g}) + 2\text{NH}_4\text{Cl}(\text{g}) \rightarrow 2\text{NH}_3(\text{g}) + \text{CaCl}_2 + 2\text{H}_2\text{O}(\text{l})$
4. (a) It neutralizes air to prevent violent combustion reaction from occurring.
 (b) Its inert and have very low b.pt of -196°C
 *MAT
5. a) X is Nitrogen. $\sqrt{1}$
 b) It is less dense than air. $\sqrt{1/2}$
 c) – In preservation of semen in artificial insemination. $\sqrt{1}$
6. a) (i) Solution A contains $\text{Pb}^{2+}(\text{aq})$ ions $\sqrt{1/2}$
 (ii) Solution B contains $\text{Al}^{3+}(\text{aq})$ ions. $\sqrt{1/2}$
 b) – A colourless liquid at cooler parts $\sqrt{1}$ of test-tube is formed.
 - A white residue remains in the test-tube. $\sqrt{1}$
7. a) to expel air that is in the combustion tube so that oxygen in it does not react with hot copper $\sqrt{1}$
 b) brown $\sqrt{1/2}$ copper metal will change to black $\sqrt{1/2}$
 c) nitrogen $\sqrt{1}$
8. (a) To increase the surface area over which the reaction occurs hence increased rate of reaction. $\sqrt{1}$
 (b) NH_3 is basic and reacts with some moles of the acid hence reduction in concentration $\sqrt{1}$
9. (a) (i) The solution changes from green $\sqrt{1}$ to brown $\sqrt{1}$ (1 mk)
 (ii) A brown $\sqrt{1}$ precipitate is formed. (1 mk)
 (b) $\text{Fe}^{3+}(\text{aq}) + 3\text{OH}^-(\text{aq}) \rightarrow \text{Fe}(\text{OH})_3(\text{s})$ $\sqrt{1}$ (1 mk) 3
10. (a) – Absorbs carbon (IV) oxide from $\sqrt{1}$ the air. (1 mk)
 (b) $2\text{Cu}(\text{s}) + \text{O}_2 \rightarrow 2\text{CuO}(\text{s})$ $\sqrt{1}$ (1 mk) 3
 (c) Because it has the rare gases. $\sqrt{1}$ (1 mk)