

Past-paper walk-through

Nitrogen and sulfur ■ 12.1

eXercise

Questions in this set

- 9701/12 N25 Q16 ■ 1 mark
- 9701/12 N25 Q24 ■ 1 mark
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Question 16

9701/12 N25 ■ Q16 ■ 1 mark

16 Oxides of nitrogen, NO_x , are involved in formation of photochemical smog and acid rain.

Which oxides of nitrogen are involved in each of these processes?

	photochemical smog		acid rain	
	NO	NO_2	NO	NO_2
A	✓	✓	✓	✓
B	x	✓	x	✓
C	✓	✓	x	✓
D	x	✓	✓	✓

Solution 16

Answer: **A**

Why

- Both NO and NO₂ take part in photochemical smog, cycling in sunlight with unburnt hydrocarbons.
- Both are also oxidised in the air and end up as nitric acid, which falls as acid rain.
- So both oxides are involved in both processes.

Question 24

9701/12 N25 ■ Q24 ■ 1 mark

24 Four reaction mixtures are listed.

- 1 $(\text{NH}_4)_2\text{SO}_4(\text{aq})$ and NaOH
- 2 $\text{NH}_4\text{Cl}(\text{aq})$ and $\text{Ba}(\text{OH})_2$
- 3 $\text{NH}_4\text{Cl}(\text{aq})$ and Na_2O
- 4 $(\text{NH}_4)_3\text{PO}_4(\text{aq})$ and HCl

Which reaction mixtures produce ammonia as a product?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 2 and 3 only **D** 3 and 4 only

Solution 24

Answer: **A**

Why

- An ammonium salt releases ammonia when warmed with any *base*.
- Sodium hydroxide, barium hydroxide and sodium oxide are all bases, so 1, 2 and 3 all work.
- Hydrochloric acid is an acid, so mixture 4 gives no ammonia.

Question 23

9701/14 N25 ■ Q23 ■ 1 mark

- 23** The oxides of nitrogen, NO and NO₂, act as pollutants in the Earth's atmosphere in a number of different ways.

Three statements about the oxides of nitrogen are listed.

- 1 They react with oxygen and water vapour to form nitric acid, a constituent of acid rain.
- 2 They react with carbon monoxide to form photochemical smog.
- 3 They catalyse the oxidation of sulfur dioxide in the formation of sulfuric acid, another constituent of acid rain.

Which statements are correct?

- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

Solution 23

Answer: **C**

Why

- Statement 1 is right: the nitrogen oxides end up as nitric acid in rain.
- Statement 3 is right too: they catalyse the oxidation of SO_2 to SO_3 in the atmosphere.
- Statement 2 is wrong – photochemical smog forms with unburnt *hydrocarbons*, not with carbon monoxide.

Question 24

9701/14 N25 ■ Q24 ■ 1 mark

24 Which reagent, when mixed with ammonium sulfate and then heated, liberates ammonia?

- A** aqueous bromine
- B** dilute hydrochloric acid
- C** aqueous calcium hydroxide
- D** potassium dichromate(VI) in acidic solution

Solution 24

Answer: **C**

Why

- An ammonium salt gives off ammonia when warmed with a base.
- Calcium hydroxide is the only base among the four reagents.
- Hydrochloric acid, bromine water and acidified dichromate are not bases.