



IB • DP • Chemistry

🕒 10 mins ❓ 10 questions

Multiple Choice: Paper 1

8.3 Acid Deposition

8.3.1 Acid Deposition / 8.3.2 Effects of Acid Deposition / 8.3.3 Reducing Sulfur Oxide Emissions

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Total Marks

/10

1 Acid rain can be up to 50 times more acidic than normal rain, which has a pH around 5.5. What is the approximate concentration of H^+ in acid rain?

A. $2.50 \times 10^{-3} \text{ mol dm}^{-3}$

B. $2.50 \times 10^{-4} \text{ mol dm}^{-3}$

C. $2.50 \times 10^{-5} \text{ mol dm}^{-3}$

D. $50.0 \times 10^{-4} \text{ mol dm}^{-3}$

(1 mark)

2 Natural gas contains on average 5.5 mg / m^3 of sulfur in the form of hydrogen sulfide, H_2S ($M_r = 34$). If a typical household in the UK consumes 0.198 m^3 of gas per day, what is the average annual emission of sulfur in g per household?

A. $5.5 \times 0.198 \times 365$

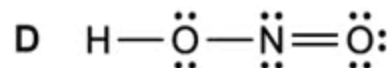
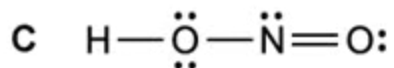
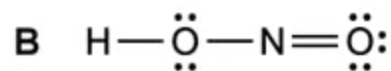
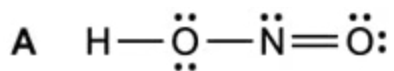
B. $\frac{5.5 \times 0.198 \times 365 \times 34}{1000 \times 32}$

C. $\frac{5.5 \times 0.198 \times 365}{1000}$

D. $\frac{5.5 \times 0.198 \times 365 \times 32}{1000 \times 34}$

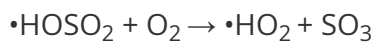
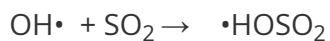
(1 mark)

3 Nitrous acid is produced when nitrogen dioxide dissolves in water to produce acid rain. What is the correct Lewis structure for nitrous acid?



(1 mark)

- 4 Hydroxyl free radicals are thought to be involved in complex reactions converting sulfur dioxide into sulfur trioxide in the atmosphere.

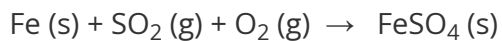


Which is true?

- A. $\text{OH}\cdot$ is catalytic
- B. $\cdot\text{HOSO}_2$ contains 24 electrons
- C. Both reactions are redox
- D. The first reaction is exothermic

(1 mark)

5 Iron structures can be damaged by dry deposition such as the equation below:



Given that,

$$\Delta H_f^\theta (\text{SO}_2) = -297 \text{ kJ mol}^{-1}$$

$$\Delta H_f^\theta (\text{FeSO}_4) = -929 \text{ kJ mol}^{-1}$$

What is the enthalpy change for this reaction?

- A. $-297 - 929$
- B. $297 + 929$
- C. $-297 + 929$
- D. $297 - 929$

(1 mark)

6 Acid deposition results in leaching of aluminium ions from the soil. Which are true?

- I. Al^{3+} ions damage plants roots
- II. Al^{3+} ions damage fish gills
- III. Al^{3+} ions affect human health

A. I and II only

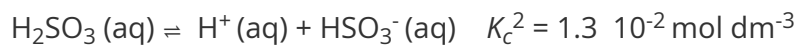
B. I and III only

C. II and III only

D. I, II and III

(1 mark)

7 The equilibrium constants for the dissociation of nitrous and sulphurous acid found in acid rain are as follows:



Which is true?

	Stronger acid	Effect on K_c of mixing the same volume and concentration the acids
A	Nitrous	No effect
B	Sulfurous	No effect
C	Nitrous	K_c^2 decreases
D	Sulfurous	K_c^1 decreases

(1 mark)

8 How many different types of ions can be found in acid rain, assuming it contains a mixture of sulfuric, sulfurous, nitric and nitrous acids?

A. 4

B. 5

C. 6

D. 7

(1 mark)

9 Historic buildings and statues have frequently suffered chemical corrosion from acid rain. Which building materials would be unaffected by this?

- A. Marble
- B. Limestone
- C. Granite
- D. Lime Mortar

(1 mark)

10 Which is true about the hydrogensulfate ion, HSO_4^- , found in acid rain?

- I. It is amphiprotic
- II. It is amphoteric
- III. Sulfur is in its highest oxidation state

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

(1 mark)