

4.3 Intermolecular Forces & Metallic Bonding

Question Paper

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| Course | DPIB Chemistry |
| Section | 4. Chemical Bonding & Structure |
| Topic | 4.3 Intermolecular Forces & Metallic Bonding |
| Difficulty | Hard |

Time allowed: 20
Score: /10
Percentage: /100

Question 1

The properties of alloys can be explained in terms of metals having

- I. Non-directional bonding
- II. Delocalised electrons
- III. Ions of different size

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

[1 mark]

Question 2

Which of the following molecules will have the highest boiling point?

- A. $\text{CH}_3\text{CH}_2\text{CHO}$
- B. $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$
- C. $\text{CH}_3\text{CH}_2\text{OCH}_3$
- D. $\text{CH}_3\text{CH}_2\text{CH}_2\text{F}$

[1 mark]

Question 3

What is the correct order of boiling points for the following molecules, from lowest to highest?

- A. $\text{CH}_3\text{F} < \text{F}_2 < \text{CH}_3\text{CH}_2\text{F} < \text{HF}$
- B. $\text{F}_2 < \text{CH}_3\text{F} < \text{CH}_3\text{CH}_2\text{F} < \text{HF}$
- C. $\text{F}_2 < \text{CH}_3\text{CH}_2\text{F} < \text{CH}_3\text{F} < \text{HF}$
- D. $\text{HF} < \text{CH}_3\text{CH}_2\text{F} < \text{CH}_3\text{F} < \text{F}_2$

[1 mark]

Question 4

In which of the following processes do hydrogen bonds get broken?

- A. $2\text{HBr}(\text{g}) \rightarrow \text{H}_2(\text{g}) + \text{Br}_2(\text{g})$
- B. $\text{C}_2\text{H}_6(\text{l}) \rightarrow 2\text{C}(\text{g}) + 6\text{H}(\text{g})$
- C. $\text{H}_2(\text{l}) \rightarrow \text{H}_2(\text{g})$
- D. $\text{NH}_3(\text{l}) \rightarrow \text{NH}_3(\text{g})$

[1 mark]

Question 5

Hydrogen bonding occurs between molecules of propanal, $\text{CH}_3\text{CH}_2\text{CHO}$, and molecules of liquid Y. Which of the following is most likely to be liquid Y?

- A. $\text{CH}_3\text{CO}_2\text{CH}_3$
- B. CH_3OH
- C. CH_3COCH_3
- D. CH_3CHO

[1 mark]

Question 6

Which of the following metals will have the greatest ability to conduct electricity?

- A. Li
- B. Mg
- C. Na
- D. Al

[1 mark]

Question 7

The following statements are all correct. Which of the statements can be explained, in part, by hydrogen bonding?

- I. Ice is less dense than water
- II. Butanone has a lower boiling point than butan-1-ol
- III. At room temperature butanone can mix with water

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

[1 mark]

Question 8

Hydrogen bonding can occur between propanal, $\text{CH}_3\text{CH}_2\text{CHO}$ and which other molecule?

- A. CH_3COOH
- B. $\text{CH}_3\text{CO}_2\text{CH}_3$
- C. $\text{CH}_3\text{CH}_2\text{F}$
- D. CH_3COCH_3

[1 mark]

Question 9

Which of the following about dimethylamine, $\text{NH}(\text{CH}_3)_2$, is correct?

| | Bond angle | Strongest type of intermolecular force present |
|----------|------------|--|
| A | 109.5 | Permanent dipole permanent dipole forces |
| B | 109.5 | London dispersion forces |
| C | 107° | Hydrogen bonding |
| D | 105° | Hydrogen bonding |

[1 mark]

Question 10

Which of the following statements are correct?

- I. The strongest type of intermolecular force between BF_3 molecules are permanent dipole permanent dipole forces
- II. The strongest type of intermolecular force between HCN molecules are permanent dipole permanent dipole forces
- III. The bond angle in HCN is larger than the bond angle in BF_3

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

[1 mark]