

Name Mr. Shank

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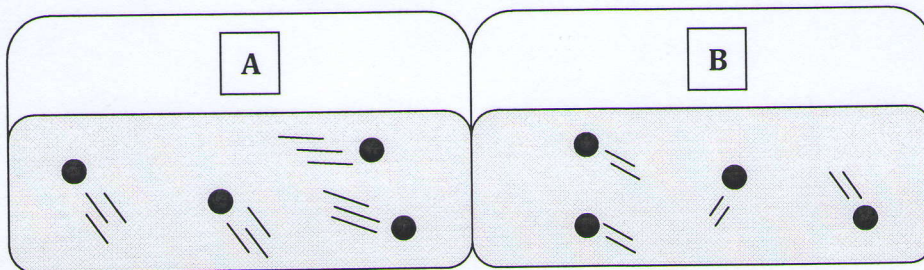
Period AP1, 2, 3

Quiz 1: Heating, Cooling, and Phase Change

Match the following phase changes with their definitions:

- | | | | |
|-----------------|-------------------------|----|---|
| Ex. Freezing | Solid <u>Liquid</u> Gas | to | <u>Solid</u> Liquid Gas |
| 1. Condensation | Solid Liquid <u>Gas</u> | to | Solid <u>Liquid</u> Gas |
| 2. Melting | <u>Solid</u> Liquid Gas | to | Solid <u>Liquid</u> Gas x3 |
| 3. Evaporation | Solid <u>Liquid</u> Gas | to | Solid Liquid <u>Gas</u> |
| EC. Deposition | Solid Liquid <u>Gas</u> | to | <u>Solid</u> Liquid Gas x2 |
| EC. Sublimation | <u>Solid</u> Liquid Gas | to | Solid Liquid <u>Gas</u> |

Two containers – A and B – hold the same gas at different temperatures. The two containers are then brought together so they touch. Answer questions 4 – 6 using the data below and the diagrams showing the containers when they first touch.



Average Molecule Speed: 16 m/s

Average Molecule Speed: 8 m/s

4. Has the higher temperature

A

B

5. Absorbs heat

A

B x3

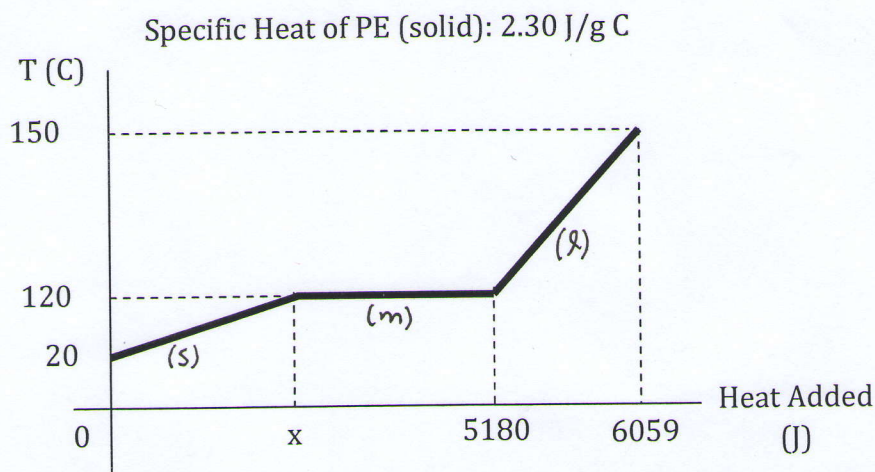
6. Has the lower vapor pressure

A

B

x6

Use the data and heating curve for 10 g of polyethylene (plastic) below for questions 7 - 13.



7. Label the regions where PE is a solid (s), liquid (l), and melting (m) on the curve above. +3

8. What is the melting point of PE? 120°C +1

9. How much heat is required to heat 10 g of PE from 20 C to melting (i.e., solve for x)?

$$q = m S_{\text{solid}} \Delta T = (10\text{g})(2.30\text{J/g}^{\circ}\text{C})(120^{\circ}\text{C} - 20^{\circ}\text{C}) = 2,300\text{J} = 2.3\text{kJ} \quad \text{+2}$$

10. What is the heat of fusion of PE? Your answer should have units of J/g.

$$\Delta H_{\text{fus}} = \frac{(5180\text{J} - 2,300\text{J})}{10\text{g}} = 288\text{J/g} \quad \text{+2}$$

11. What is the specific heat of liquid PE? +2

$$q = m S_{\text{liquid}} \Delta T \Rightarrow (6059\text{J} - 5180\text{J}) = (10\text{g}) S_{\text{liquid}} (150^{\circ}\text{C} - 120^{\circ}\text{C}) \Rightarrow S_{\text{liquid}} = 2.93\text{J/g}^{\circ}\text{C}$$

12. PE has stronger overall intermolecular forces than water. How can we see this from the heating curve above? +1

The melting point of PE (120°C) is much higher than the melting point of water (0°C).

13. Given that PE has the molecular formula $(\text{C}_2\text{H}_4)_n$ (where n can be as large as 250,000!), briefly explain why PE has greater overall intermolecular forces than water. +2

Although water has stronger dipole-dipole forces and hydrogen bonding, PE has much greater London dispersion forces, since it is such a large molecule.

+13