Chapter 12 Practice Problems: Intermolecular Forces and Physical Properties

Consider the table of data below and then answer the questions that follow.

Substance	**Melting Point** (^{o}C)	**n-Boiling Point** (^{o}C)	**Conductivity**		
			When solid	**When Liquid**	**In solution (dissolved in water)**
A	0	100	None	Poor	---------
B	400	957	None	Good	Good
C	-50	-5	None	None	None
D	-10	60	None	None	Good
E	200	700	None	Good	Good
F	98	890	Good	Good	Dissolves to form new compounds
G	-39	357	Good	Good	Does not dissolve in water

1. Which three substances are liquids at room conditions (approx. 25^{o}C and 760 torr)? Which of these has the highest surface tension? Briefly explain your reasoning

2. Which substances are metals? Briefly explain your reasoning.

3. Which two substances are ionic substances? Briefly explain your reasoning

4. In what physical state would substance C be found at 50^{o}C? At -50^{o}C?

5. Which substance is molecular but changes to ionic when dissolved in water? Briefly explain your reasoning

6. Which three substances are made up from molecules? Briefly explain your reasoning

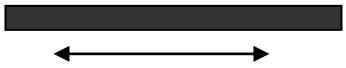
7. Of your three answers to question 6, which is most likely to have the strongest intermolecular bonds? Briefly explain your reasoning

8. Of your three answers to question 6, which is most likely to have the weakest intermolecular bonds? Briefly explain your reasoning

9. Which of the substances is most likely to be the metal mercury. Briefly explain your reasoning

10. Using your answers to questions 2 and 9 deduce which substance is most likely to be the metal sodium. Briefly explain your reasoning and write the balanced equation for the formation of the new compound formed when sodium reacts with water.

11. Complete the following table. In each case offer a **brief** explanation of the property in terms of a **RELEVANT TYPE OF BONDING** present in the substance.

Substance	Property	Explanation in terms of bonding present
Diamond (Elemental Carbon)	• Extremely hard • Does not conduct electricity	
Graphite (Elemental Carbon)	• Soft • Conducts electricity in ONE plane  Direction of electrical conductivity in a piece of graphite	
Aluminum	Excellent conductor of heat	
Aluminum Oxide	Used to line furnaces	
Bromine gas	Low boiling point	

12. Why are drops of water spherical in shape? Explain in terms of surface tension and IMF's.

13. How does an increase in temperature affect the vapor pressure of a liquid? Why?

14. How does an increase in temperature affect the viscosity of a liquid? Why?

15. Why does a pressure cooker cook food faster (e.g. spaghetti noodles) than in a normal cooking pot?

16. Why does fanning cause you to feel cooler?