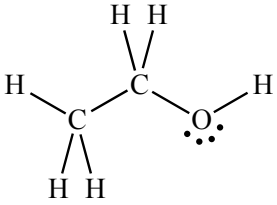
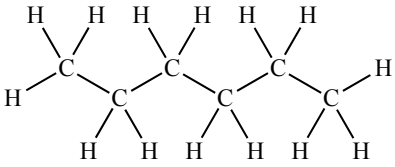
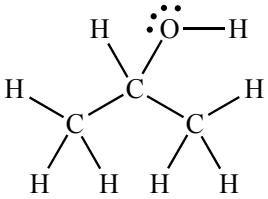
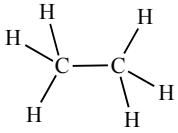
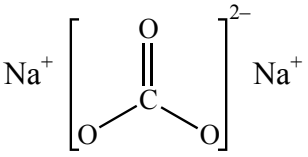
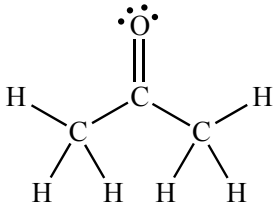
Demo [15 pts]
Conductivity, bp and mp

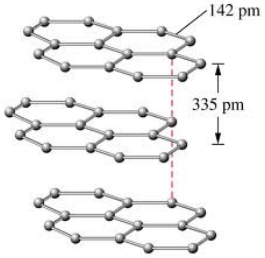
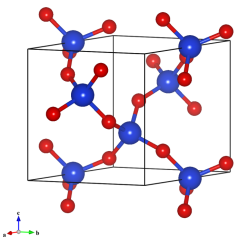
Name_____
Period _____ Date_____

Introduction: To study and understand the conductivity, melting pts and boiling pts of substances.

TABLE OF ALL THE SUBSTANCES IN THIS LAB:

POLAR COVALENT MOLECULAR	NON POLAR COVALENT MOLECULAR	IONIC	METALLIC
ethyl alcohol mp = –117.3°C bp = 78.5°C 	**Hexane** mp = –95°C bp = 69°C 	**NaCl** (Sodium Chloride) mp = 800°C Na^+ Cl^-	**Lead (Pb)** mp = 327°C e^- e^- Pb^{+2} e^- Pb^{+2} e^-
isopropyl alcohol mp = –89.5°C bp =82.4 °C 	**ethane gas** mp = –183°C bp = –88°C 	**Na_2CO_3** (sodium Carbonate) mp = 851°C 	**Copper (Cu)** mp = 1085°C e^- e^- Cu^{+2} e^- Cu^{+2} e^-
Acetone mp = –95.4°C bp = 56.2 °C 			

NETWORK COVALENT

Diamond (C)	**Graphite (C)**	**Quartz (SiO_2)**
mp = 3550°C	mp= 3500 °C	(no distinct mp)
		

PART 1: Conductivity: I will demonstrate the conductivity of each of the following substances using the light bulb set up. Record conductivities below.

lead (s)_____ Na_2CO_3 (s) _____ NaCl (aq) _____
copper (s) _____ NaCl (s) _____ graphite _____

1) Do copper and lead conduct electricity when solids? _____ Explain why or why not. *(Include a description of their general structure.)*

2) Does a solution of NaCl dissolved in water, *NaCl (aq),* conduct electricity? _____
Explain why or why not. *(Include a description of what is in the solution.)*

3) As pure solids, do Na_2CO_3 and NaCl conduct electricity? _____
Explain why or why not. *(Include a description of what the solids consist of.)*

4) Would molten NaCl, *NaCl (l),* conduct electricity? ____ Explain why or why not. *(Again- describe substance.)*

5) Does graphite conduct electricity?_____ Explain why or why not. *(Include a description of its structure.)*

6) Diamond does **not** conduct electricity. Explain why not. (*Include a description of its structure.)*

PART 2: Range of Melting points: Look at the melting points of **ALL** the substances listed on front.

7) What is the melting point of NaCl?_____ This is a relatively high melting point. Explain why it is so high. *(Be specific describe the attractions that must be broken and explain why they are so strong.)*

8) What is the melting point of lead? ____ This is a relatively high melting point. Explain why it is so high. *(Be specific describe the attractions that must be broken and explain why they are so strong.)*

9) Give the names of the three network covalent substances listed on the front page of this demo:

_____ _____ _____

Why do these substances have such high melting points?

PART 3: Boiling Point Comparisons: Look at boiling points and structures on front.

10) Draw two molecules of isopropyl alcohol, put in partial charges and use a dotted line to show an attraction between molecules (Show an example of the strongest possible type of attraction.)

11) Draw two molecules of acetone, put in partial charges and use dots to show attraction between molecules. (Again, show an example of the strongest possible type of attraction.)

12) For both of the diagrams in #10 and #11, write in the type of intermolecular bond which holds the two molecules together. Draw an arrow pointing to where that intermolecular bond is in each diagram.

13) What is acetone's boiling point?_____ What is isopropyl alcohol's? _____
Why is acetone's boiling point considerably lower than isopropyl alcohol's?

14) What is ethane's boiling point? _____ What is ethyl alcohol's boiling point? _____
Why does ethane have a significantly lower boiling point than ethyl alcohol?

15) What is the boiling point of hexane? _____ What is the boiling point of ethane? _____
Why does hexane have a considerably higher boiling point than ethane? *(Be careful—both are NP)*

16) Use your knowledge of properties of substances to rank the following substances from lowest boiling point to highest boiling point. To do so, on the back of this sheet, first identify the type of attraction that must be broken to boil each substance. *(For all covalent molecules, Lewis Dot Structures and 3D structures must be shown.)*. Second, rank the substances by boiling points and give reasons for your ranking: KNO_3, CO, NH_3, Ne, $H_2N–NH_2$*

*For this substance, I am giving you its simplified structure. Keep atoms in the order given. There are no double or triple bonds.