

Name Key

Date 2018-19 Period



Super Chemists' Chemistry

Unit 2 Test Sweet Sheet

Answer all of the questions completely. Check your answers with the key to decide how you will do on the test.

1. Can you classify matter? Fill in the diagram below.

Matter

Can be separated by physical means

mixture

Cannot be separated by physical means

pure substance

Separated by chemical means

uniform

non-uniform

cannot be sep. chem.

homogeneous

heterog.

compound

atom

2. On a separate sheet of paper, write the definitions to all of the following words. You will have matching vocabulary on all of these words on your test.

Matter, mass, weight, density, volume, solid, liquid, gas, element, atom, compound, Law of Definite Composition (or Proportions), molecule, mixtures, homogeneous mixtures, heterogeneous mixtures, physical property, chemical property, chemical change, physical change, endothermic reaction, exothermic reaction, activation energy, Law of Conservation of Mass, Law of Conservation of Energy, precision, accuracy, meniscus, scientific notation, significant figures, latent heat of fusion, latent heat of vaporization, distillation, filtration, Kinetic energy, Potential energy, pure substance

3. Determine whether the properties are chemical or physical.

a. chromium does not rust C

b. water boils at 100 degrees Celsius P

c. yellow in color P

d. flammability C

e. solubility P

f. bitter taste P

g. melting point P

h. reacts with water to form a gas and heat C

i. luster P

j. odor P

k. toxicity C

4. Density Problems

a. Find the density of a substance with a mass of 5.45g in 29 mL of solution.

$$\frac{5.45g}{29ml} = 0.188 g/ml$$

b. If the density of Katriuim is 9.37g/ml, how many milliliters does Mrs. Smith need to get 18.7g of Katriuim?

$$\frac{18.7g}{9.37g} \times 1ml = 1.99 ml$$

c. The density of lead is 11.34 g/cm³. If a Super Chemist has 48 ml of lead, how many grams does she have?

$$\frac{48ml}{cm^3} \times 11.34g = 544.3g$$

d. If a substance has a mass of 2.457g and takes up 9.245 ml of volume, what is the density of the substance?

$$\frac{2.457g}{9.245ml} = 0.266g/ml$$

Part 5: Circle the correct answer, fill in the blank, or answer with a sentence. 😊

1. A mixture (**is, is not**) a chemical combining of substances.
2. In a compound the (**atoms, molecules**) are (**chemically, physically**) combined so that the elements that make up the compound (**retain, lose**) their identities and (**do, do not**) take on a new set of properties.
3. The smallest identifiable unit of a compound is a(n) molecule, which is made up of atoms which are chemically bonded.
4. True or False: A mixture is always made up of a combination of elements.
5. In a mixture, the substances (**lose, retain**) their identities.
6. In a mixture the substances involved (**can, cannot**) be separated by a simple physical process.
7. In a compound the elements involved (**can, cannot**) be separated by a simple physical process because the elements are (**physically combined, chemically bonded**).
8. True or False: An element can be broken down into a simpler substance.
9. The smallest identifiable unit of an element is a(n) atom.
10. From the following list of substances, circle the ones that are elements:

Silver

carbon dioxide

wood alcohol

chromium

Water

hydrogen

carbon

nitrogen

Oxygen

gold

sugar

salt

Air

sulfur

magnesium

nickel

11. Explain how to separate the sugar and water solution in a solution of sugar and water.

Evaporation

12. How would you separate a mixture of alcohol and water?

distillation

13. How would you separate sand and water?

decant the H₂O

14. Classify the following as pure substances or as mixtures:

Air M

gasoline M

grain alcohol PS

Water PS

sugar PS

gold PS

Mercury PS

oxygen PS

salt water ~~PS~~ M

15. Classify the following as heterogeneous or as homogeneous:

Sand and salt mixture Heterog

hydrogen

iron

Salt water Homog

unfiltered air heterog

iron with rust heterog

Pure water Homog

an apple heterog

nitric acid

Tossed salad heterog

granite heterog

wood heterog

16. Classify the following as an element, a compound, a solution (homogeneous mixture), or a heterogeneous mixture:

Aluminum E

raisin bread HET

Carbon dioxide C

water C

Sugar and water ~~PS~~ HOM

sulfur E

Sulfuric acid C

mercury E

An orange HETM

water and instant tea HOM

A pencil HETM

carbon particles and sugar HET

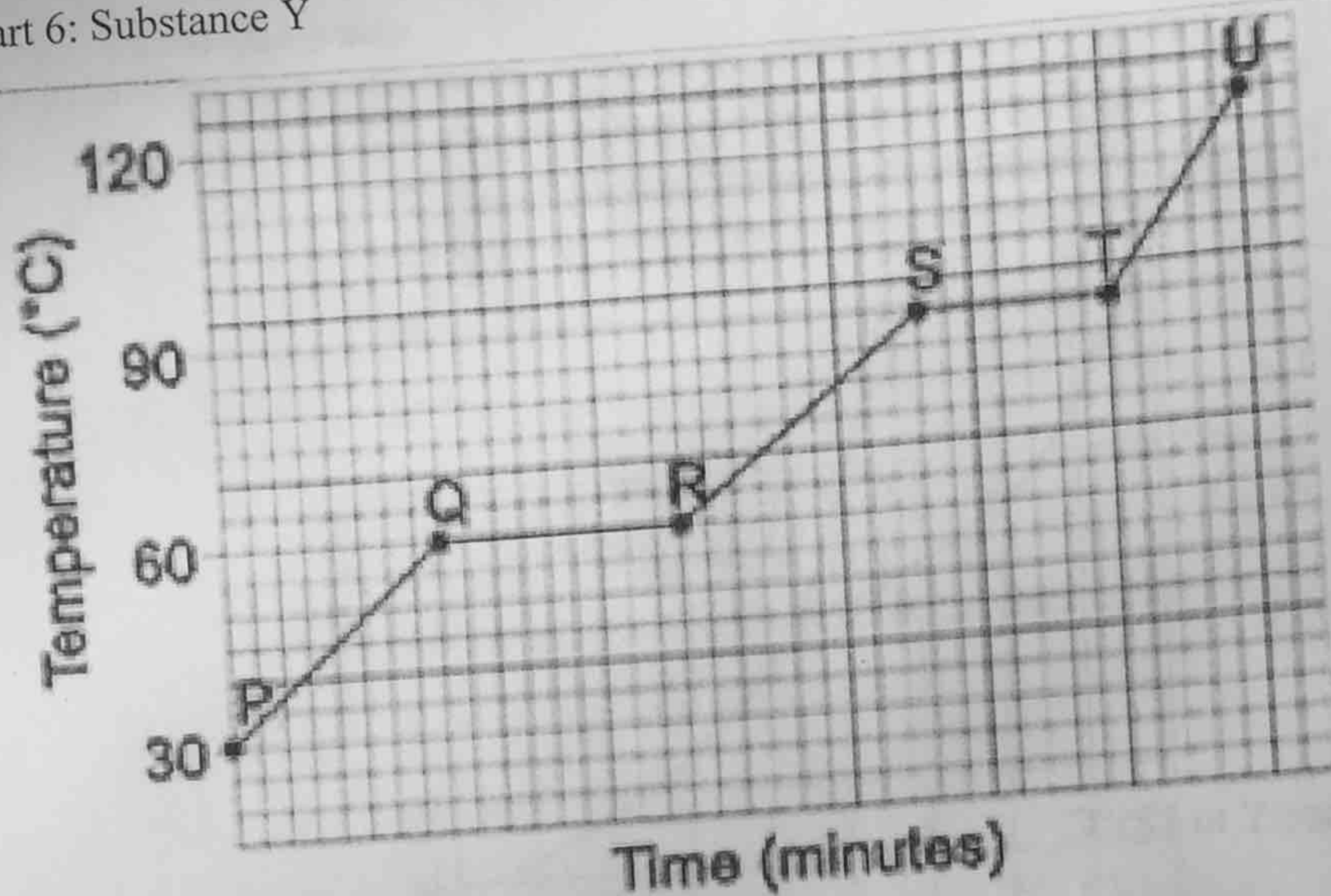
Nitrogen E

air HET

Gasoline ~~PS~~ HOM M

grain alcohol C

Part 6: Substance Y



1. What is the boiling point of substance Y? 90°C
2. What is the melting point of substance Y? 60°C

Given:

Heat of Fusion for Substance Y	Heat of Vaporization of Substance Y	Specific Heat of Substance Y (solid)	Specific Heat of Substance Y (liquid)	Specific Heat of Substance Y (gas)
35 kJ/g	76 kJ/g	13 J/g·°C	18 J/g·°C	29 J/g·°C

Calculate the amount of energy in kJ it takes to heat 105g of Substance Y from -3°C to 125°C .

Step 1: Heat up the solid to the boiling point. Show your work below.

$$\frac{105\text{g}}{\cancel{\text{g}} \cdot \cancel{\text{C}^{\circ}}} \times \frac{13\text{J}}{\cancel{\text{g}} \cdot \cancel{\text{C}^{\circ}}} \times (60 + 3)^{\circ}\text{C} = 85,995\text{J}$$

Step 2: Melt Substance Y.

$$\frac{105\text{g}}{\cancel{\text{g}}} \times \frac{35\text{kJ}}{\cancel{\text{g}}} = 3,675\text{kJ}$$

Step 3: Heat up Substance Y to the boiling point.

$$\frac{105g}{g \cdot ^\circ C} \left| \frac{18J}{g \cdot ^\circ C} \right| \frac{30^\circ C}{g \cdot ^\circ C} = 56,700J$$

Step 4: Boil Substance Y.

$$\frac{105g}{g} \left| \frac{76kJ}{g} \right| = 7,980kJ$$

Step 5: Heat up Substance Y to 125°C.

$$\frac{105g}{g \cdot ^\circ C} \left| \frac{29J}{g \cdot ^\circ C} \right| \frac{(125 - 90)^\circ C}{g \cdot ^\circ C} = 106,575J$$

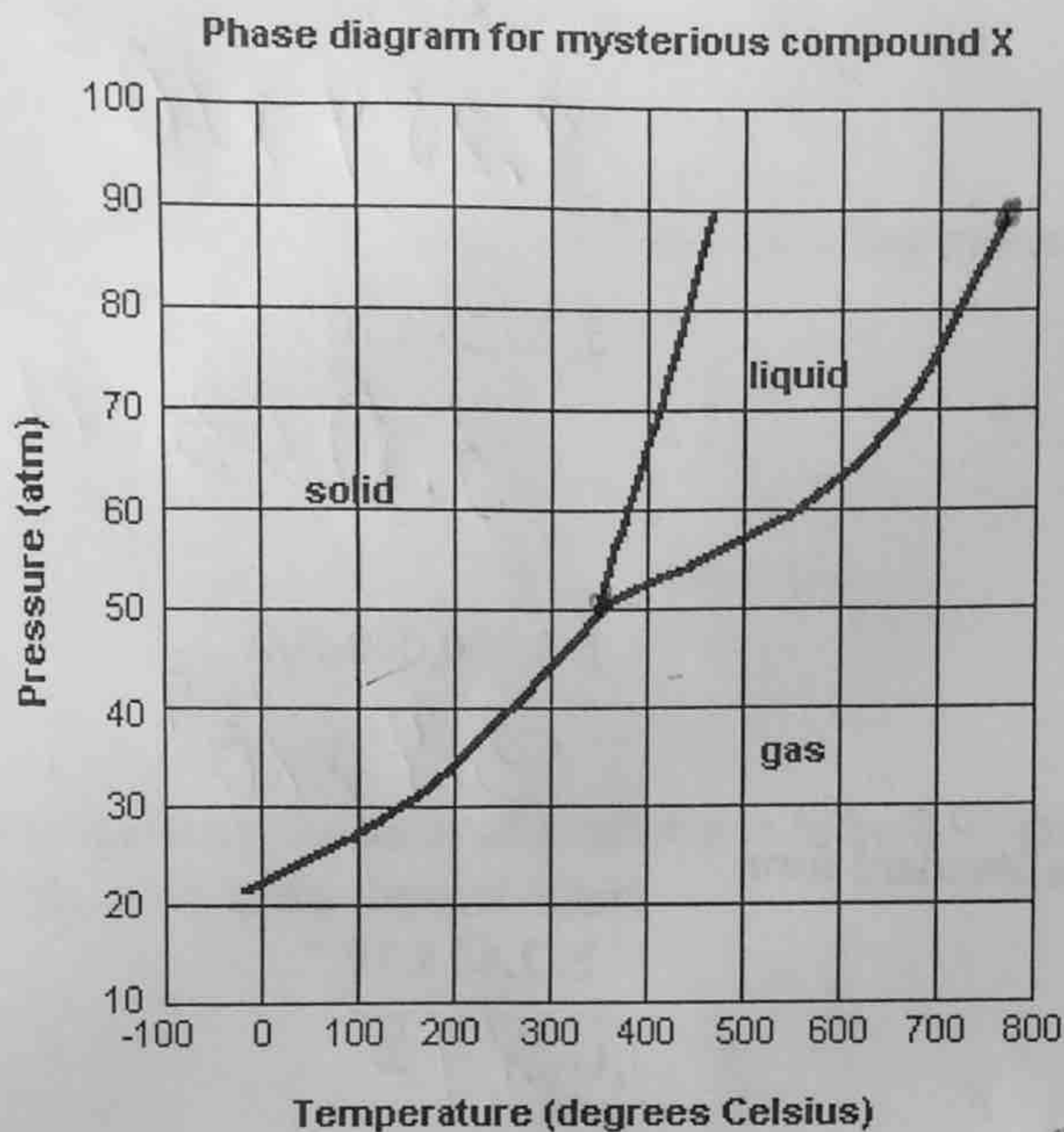
Add Steps 1-5 to find total amount of energy used.

$$\begin{array}{r} 85.995 \text{ kJ} \\ 3,675 \text{ kJ} \\ 56.700 \text{ kJ} \\ 7,980 \text{ kJ} \\ 106.575 \text{ kJ} \end{array}$$

$$\textcircled{11,904 \text{ kJ}}$$

Part 7: Phase Diagrams

For each of the questions on this worksheet, refer to the phase diagram for mysterious compound X.



- 1) What is the critical temperature of compound X? 780°C
- 2) If you were to have a bottle containing compound X in your closet, what phase would it most likely be in?

gas

- 3) At what temperature and pressure will all three phases coexist?

350°C, 51 atm

- 4) If I have a bottle of compound X at a pressure of 45 atm and temperature of 100°C, what will happen if I raise the temperature to 400°C?

It will sublime

- 5) Why can't compound X be boiled at a temperature of 200°C?

It goes straight from a gas to a solid

- 6) If I wanted to, could I drink compound X?

Nope, too hot!!

Part 8: Review Problems

Scientific Notation- Write the following numbers in scientific notation.

a. 583.3×10^{-3}

5.833×10^{-1}

b. 9.284×10^3

9.284×10^3

c. 0.0234×10^4

~~234~~ 2.34×10^2

d. 30.23×10^{-6}

3.023×10^{-5}

e. 0.0034

3.4×10^{-3}

f. $3,400,000,000$

3.4×10^9

Write the following numbers in standard form.

a. 8.34×10^2

834

b. 2.45×10^{-4}

000245
.000245

c. 92.4×10^5

9240000

9,240,000

d. -2.1×10^{-1}

-.21

Significant Figures- determine the number of significant figures

a. 0.02340

4

b. $30.$

2

c. 2.0042500

8

d. 600.0056

7

Dimensional Analysis

a. Convert 2.98 kg. to g.

$$\frac{2.98 \text{ kg} \left| \frac{1000 \text{ g}}{1 \text{ kg}} \right.}{1 \text{ kg}} = 2.98 \times 10^3 \text{ g}$$

b. If 6.02×10^{23} atoms of Tin equal 1 mole of Tin, how many moles of Tin are there if we have 9.24×10^{25} atoms of Tin?

$$\frac{9.24 \times 10^{25} \text{ atoms} \left| \frac{1 \text{ mol Tin}}{6.02 \times 10^{23} \text{ atoms}} \right.}{6.02 \times 10^{23} \text{ atoms}} = 1.53 \times 10^2 \text{ moles}$$

Percent Error

a. A super chemist determined the mass of a substance to be 8.93 grams. If the actual mass of the substance is 8.76g, what is the percent error?

$$\frac{8.76 - 8.93}{8.76} \times 100 = 1.9\%$$

b. Sammy and Jo found the length of a string to be 3.45 m long. If the actual length of the string was 3.47m long, what is the percent error?

$$\frac{3.47 - 3.45}{3.47} \times 100 = .58\%$$

Rough Test Outline

Part A: Vocabulary

Part B: True or False

Part C: Classification of Matter

Part D: Chemical/Physical Properties

Part E: Chemical/Physical Changes

Part F: Freezing and Boiling Point Diagrams

Part G: Phase Change Diagram

Part H: Review Problems