Physical Science: Chemistry Semester
Exam Review Answers

(scroll down for answers)

Unit 1: Inquiry/Reflection (Ch. 1)
You will have several different types of graphs on the final exam that you will have to answer questions about. You will need to know the difference between a pie, line, and bar graph! Here are some questions about different graphs:

1) Look at the pie graph on p.472. What is the percent of elements in the universe that are **not** hydrogen?
6.5% (100 – 93.5 = 6.5) or (6.3 + 0.2 = 6.5)

2) The purpose of any graph can usually be found in the **(title or x-axis label)** of the graph.

3) Which axis does the dependent variable go on? (p. 22)
Y-axis (the vertical axis ↑)

4) You will need to know how to figure out a ratio. For example: if there are **15** students who pass this exam and **2** who fail it, what is the ratio of students who pass compared to the number of students who fail? (You need to write any ratio in this format: ___: ___)
Write the ratio here:
15:2

5) On page 34 there is a bar graph whose purpose is to show an object's falling time. Write the ratio that tells the

number of seconds it takes a shoe to fall compared to how long tissue takes to fall:

3.9:5

6) On page 492 there is a line graph comparing the pressures and volumes of a fixed amount of gas at a constant temperature. What would the volume of a gas be if the pressure were 150 kPa?

300 L

7) Look at the same graph. What would the pressure of gas be if the volume were 100 L?

450 kPa

You should recognize and understand a phase change diagram.

Unit 10: States of Matter (Ch. 6.1, 6.2, 15.1, 15.2, 16.1)

Word Bank for #1-7:
energy heat liquid physical same state temperature

As matter changes from solid to 1. **liquid** to gas or back again, it is changing its phase, or 2. **state** of matter. When it goes through these 3. **Physical** changes, it takes 4. **energy** to break the bonds holding the solid, liquid, or gas together. While the energy is being used to break the bonds, the 5. **temperature** of the substance stays the 6. **same** until all of the substance has changed into the new state. Then the temperature can continue to rise or fall as 7. **heat** energy is added or removed.

8. Thermal energy is added to water to turn it into steam. Explain what is happening to the motion of the molecules when this happens. (Review or p.480)

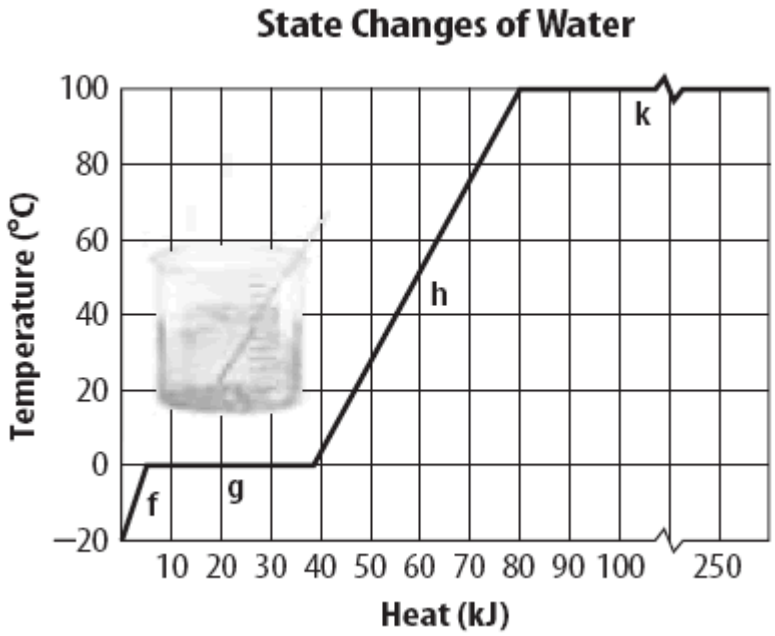
The molecules move faster as thermal (heat) energy is added. This increases their temperature and kinetic energy.

9. Adding thermal energy to a solid normally causes the temperature of the solid to increase except when the solid

is melting. Explain what the thermal energy is used for as the solid melts. (Why doesn't the temperature rise while it is busy melting?) (Review or p.480)

The thermal energy is being used to break the bonds that hold the liquid particles together. When all the bonds are broken, the temperature of the gas (steam) will increase.

10. Draw what a line graph of a substance would look like as it goes from solid to liquid to gas: (Phase Change diagram handout or see part of diagram on p.480)



11. What is the <u>difference</u> between a physical change and a chemical change? (Review or p. 460- 462)

Chemical: a new substance is created
Physical: nothing new is created.

12. List at least 3 **physical** properties: (Review or p. 458-459)

Color, shape, size, density, melting point, boiling point, freezing point, magnetism, conductivity, flexibility/malleability

13. List at least 3 **chemical** properties (Review or p. 461-464)

The ability to:

- **Combust (flammability)**
- **Rust (combine with oxygen to form an oxide)**
- **Combine with _____ to form a gas**
- **React with light to form a new compound**
- **React with ___ to produce heat**
- **React with ___ to create light**
- **React with ___ to create sound**

14. When two atoms combine to form a new substance(s), does the **mass (stay the same or change)?** (Review or p. 465)

(because of the Law of Conservation of Mass)

15. What do we use to measure **mass**? (p. 19 and 20)

Mass is measured in grams with a balance/scale.

16. In a **(compound or mixture)** the substances are chemically bonded to each other. In a **(compound or mixture)** they are not bonded together. (p.452)

Unit 11: Atomic Structure (Ch. 17 and 18.1)

17. What does the term 'periodic' mean? (p. 516)

A pattern that repeats

18. How are elements arranged on the modern periodic table? (p. 529)
    - **By increasing atomic number (the # of protons)**
    - **By groups (columns) according to their chemical properties.**
    - **By periods according to the number of electron shells (rows)**

19. Be sure your copy of the periodic table has the metals, nonmetals and metalloids labeled or colored, as well as the liquids and gases labeled. (back cover of book)

(Don't forget to bring it on the day of the exam!!!)

20. How many electrons can the first energy level hold? (p. 520) **2**

21. How many electrons can the second energy level hold? (p. 520) **8**

22. Which Russian scientist developed the first periodic table? (p. 516, 517) **Dmitri Mendeleev**

23. Which conducts electricity and heat best, metals, nonmetals or metalloids? (p. 523)

metals

24. Where on the periodic table can you find the number of outer-level electrons an element has? (p. 520)

You look at the group (family/column) that the element is in.

25. What are isotopes? (p. 529 or 514)

Same element, but with a different # of neutrons.

26. How are isotopes written? (give an example of two isotopes of the same element) (p. 515)

Symbol – mass or C-12 or C-14

27. Where are protons found in an atom? (p. 507)

inside the nucleus

28. Where are electrons found in an atom? (p. 511)

Electron cloud

29. Where are neutrons found in an atom? (p. 507)

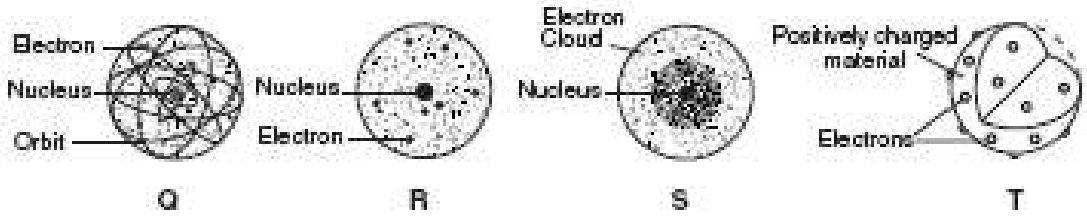
in the nucleus

30. If 2 elements are in the same **group** on the periodic table they will have similar chemical properties. (p. 522)

31. What is the average atomic mass? (p. 529) **The weighted average of the atomic masses of an element's naturally occurring isotopes.**

32. Underneath each model of the atom, write the name of the scientist credited with proposing it and the year. Under the current model we use today, there is no one scientist

who gets the credit, so just write the words "today's model." (p. 510)



Bohr 1913 **Rutherford 1911** **Today's model** **Thompson 1904**

Unit 12: Chemical Compounds and Naming Compounds (Ch. 20)

33. How can you tell if a compound is **ionic** by looking at the formula and the periodic table? (p. 610) **If it has a metal and a nonmetal, it is ionic.**

34. Be able to find how many atoms there are of an element by looking at the chemical formula. Examples: Ba_3N_2

Ba = **3** N = **2**

35. How can you tell if a compound is **covalent** by looking at the formula and the periodic table? (p. 611) **If the two elements are *both* nonmetals, it is covalent.**

36. Be able to write the correct formula for the compound that would happen when two ions combine. You may need your oxidation chart for this if the oxidation number isn't given. Examples:

K^+ and Cl^- = **KCl** Mg^{+2} and O^{-2} = **MgO** K^+ and O^{-2} = **K_2O**

Mg^{+2} and Cl^{-} = **$MgCl_2$** Ba and Cl = **$BaCl_2$** K and N = **K_3N**

37. Be able to name **ionic** compounds when given the formula:(handout or p. 618)

Na_2S = **sodium sulfide** SnS_2 = **tin sulfide**

Al_2S_3 = **aluminum sulfide** Ba_3N_2 = **barium nitride**

38. Be able to name **covalent** compounds when given the formula: (handout, p. 620-621)

NO = **nitrogen monoxide** or **nitrogen oxide**
NO_2 = **nitrogen dioxide**
N_2O = **dinitrogen oxide**
N_2O_5 = **dinitrogen pentoxide**

Unit 13: Chemical Reactions (Ch. 15.2 and 21)

39. What is the difference between exothermic and endothermic? (Review or p. 648,640)
Exothermic: gives off energy
Endothermic: takes in energy

40. Fill in the blanks below with reactants or products: (Review or p. 632)

reactants → **products**

41. If something requires oxygen to burn, oxygen will appear on which side of the chemical equation? (See #53 for the names of the sides) (p. 641)

The reactant side.

42 Which number is the **coefficient** in this chemical formula? (Review) 3 H_2O

3

43 What number is the **subscript** in this chemical formula? (Review) 3 H_2O

2

44 When a chemical reaction takes place, it creates a chemical change. This breaks bonds between the **(atoms** or compounds) in the reactant compounds. This process requires **energy.** (Review)

45 Because of the law of conservation of mass, we know that the **mass** of the reactants will **equal** the mass of the products. (Review or p. 632)

46 If you are given a chemical equation to balance, what do you need to do? (Review or p.638)

a. **Count the atoms in the reactants and compare that to the atoms in the products**
b. **Choose coefficients for reactants and products so that there are same # of atoms of each element on each side of the arrow**
c. **Recheck your work to be sure the mass of the reactants = the mass of the products**

47 Circle the chemical equation that is balanced:

d. $2H_2O \rightarrow 2H + O_2$

e. $2H_2O \rightarrow 4H + O_2$

Unit: Acids and Bases (Ch. 23)

48 An acid produces **hydrogen ions [H^+]** in a water solution. (Review, p.696)

49 What do indicators do in the presence of an acid or base? (Review or 696) **indicators turn color when touched by an acid or base**

Understand what is shown on the charts that go with questions 31 and 32 on p. 721 and questions 6, 7, and 8 on p. 722:

50. p.721, #31: **red (base)**

51. p.721, #32: **3 mL**

52. p. 722, #6: **1 (A)**

53. p. 722, #7: **50 (C)**

54. p. 722, #8: **salt only (C)**

55. If a base only partially dissociates into ions in water, we say it partially **(ionizes or re-ionizes)** and it is a **(strong or weak)** base. (Review or p.702)

56. What do antacids have in them that allow them to neutralize your gastric juices? (p. 707) **They have bases to neutralize the excess stomach acids.**

57. Write the chemical formula for hydrochloric acid: (p.697) **HCl**

58. When a negative ion from a base [OH^-] bonds with a positive ion from an acid [H^+], what type of compound is formed? (Review or p. 707) **H_2O**

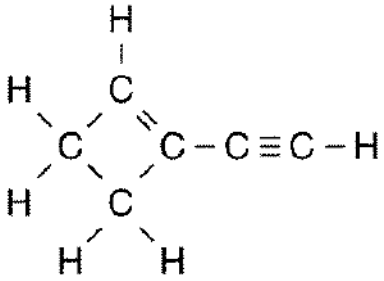
Unit: Organic Chemistry (Ch. 24)

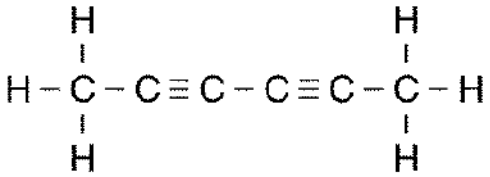
59. Hydrocarbon molecules are made up of **hydrogen** and **carbon.**
(Review or p.727)

60. All organic compounds must have what element in them? (Review or p.726) **carbon**

61. What is a polymer? (Review or p. 739)
A long, chain-like molecule made up of many smaller, simpler molecules (monomers).

62. What are isomers? (Review or p.729)
Same chemical formula, different structure (put together differently)
***Both have the chemical formula C_6H_6**





63. A hydrocarbon with all <u>single</u> bonds will end with **–ane.**

64. A hydrocarbon with at least one <u>double</u> bond will end with **-ene.**

65. A hydrocarbon with at least one <u>triple</u> bond will end with **-yne.**

66. Know how to **<u>write the chemical formula</u>** by looking at the structural model:

A. C_2H_6 B. C_4H_4

67. **<u>Name</u>** the above compounds:

A: **ethane** B. **butene**

(Use your carbon prefix chart)

Use your Organic Chemistry Review or the pages given to fill this table out.

Biological Polymer	Monomers	Monomers must have	Examples
Proteins p. 742	68. **amino acids**	carboxylic acid group (-COOH) and	45. **Meat, dairy products**

		amine group ($-NH_2$)	
Nucleic acids p. 744	69. **nucleotides**	4 organic bases, a sugar, and a phosphate unit	**72. DNA**
Carbohydrates p. 745	70. **Sugars, starches**	twice as many hydrogen atoms as oxygen atoms	73. **Sucrose, fructose, glycogen**
Lipids p. 746	71. **fats and oils**	carboxylic acid group (-COOH) and less oxygen than carbohydrates	74. **Cholesterol, Saturated and unsaturated fats**