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8th Grade Science Second Semester Skill Review

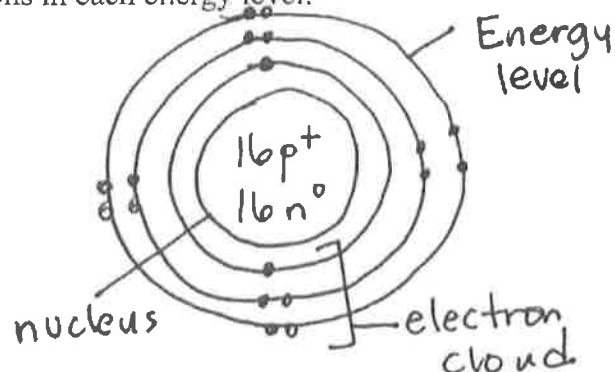
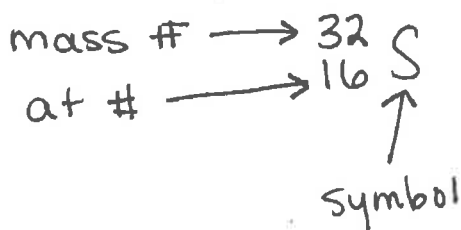
Chapter 20: Introduction to Atoms

1. In each box of the table below, write the name of the scientist(s) associated with the statement. Choose from the following: Democritus, Rutherford, Thomson, Dalton, Bohr, Schrodinger, and Heisenberg.

Dem R T Dal B S H

A. Most of an atom's mass is in the nucleus. R	B. There is a small, dense, positively charged nucleus. R
C. There are small, negatively charged particles inside an atom. T	D. Electrons can jump from a path in one level to a path in another level. B
E. Atoms of different elements are different. Dal	F. He conducted the cathode-ray tube experiment. T
G. Atoms are small, hard particles. Dem	H. Atoms contain mostly empty space. R
I. Atoms are "uncuttable." Dem	J. He conducted experiments in combining elements. Dem T
K. Electrons travel in certain paths, or energy levels. B	L. Electron paths cannot be predicted. S & H
M. His theory of atomic structure led to the "plum-pudding" model. T	N. His model had electrons surrounding the nucleus at a distance. R
O. Atoms of the same element are exactly alike. Dal	P. Electrons are found in electron clouds, not paths. S & H
Q. All substances are made of atoms. Dal	R. Atoms are made of a single material formed into different shapes and sizes. D
S. He conducted the gold foil experiment. R	T. He wanted to know why elements combine in specific proportions. Dal

1. Draw the Bohr model of sulfur. Be sure to include symbol, at. #, mass #, label nucleus, electron cloud, energy levels, show number of protons, neutrons, electrons in each energy level.

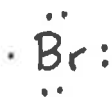


2. Draw a Lewis structure for the following atoms:

N



Br



Ca



Ra



3. Helium is located in group 18 but has only 2 electrons in its outer energy level. How is it different from the other elements in group 18 and how is it alike?

It is different b/c it only has 2 e⁻, but alike b/c its outer valence is full.

4. Fill in the table below.

Element symbol	Atomic number	Atomic mass /mass number	Protons	Neutrons	electrons	Atom isotope, ion
Bi	83	209	83	126	83	atom
Ra ²⁺	88	226	88	138	86	2+ ion
H	1	1	1	0	1	iso
H	1	2	1	1	1	iso

5. Explain why an atom of an element is neutral.

When # p⁺ equals # e⁻

6. What would be the charge on a neutral atom that loses 3 electrons? +3

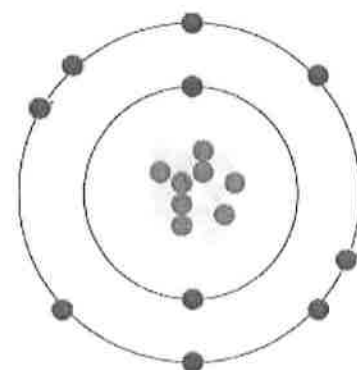
7. What would be the charge on a neutral atom that gains 1 electron? -1

8. What element is this? Oxygen

What is its mass number? 16

What is its atomic number? 18

Is it an atom or an ion? ion (-2 charge)



9. Complete the chart shown here

	Symbol	Location	Charge (amount)	Mass
Proton	p ⁺	nucleus	+1	1 amu
Neutron	n ⁰	nucleus	0	1 amu
electron	e ⁻	electron cloud	-1	0 amu

Chapter 21: The Periodic Table

2 valence e^- so it tends to lose 2 e^- to form a +2 ion

1. What are the letters and numbers for this element called, and what information can you get from them?

- Mg is the symbol for Magnesium
- 2nd group/family (alkaline earth)
- When neutral it has 12 p^+ & 12 e^-
- Average mass 24.312 amu, so most common isotope has 12 n^0
- period 3, so e^- in 3rd energy level

	Group	2
Period	12	24.312
	3 Mg	

2. What are the properties of metals, nonmetals, metalloids and noble (inert) gases and where are they located on the periodic table.

metals: shiny, malleable, ductile, good conductors
Left of zig zag line

nonmetals: dull, brittle, poor conductors
Right of zig zag line

metalloids: properties of both metals & nonmetals
used as semiconductors. Along zig zag line.

noble gases: unreactive; full outer valence

3. Use the periodic table to tell which element each of the following would be.

- a. Mg This element is in Group 2, Period 3.
- b. Na This element is an alkali metal with 3 energy levels.
- c. F This element is the halogen with 5 energy levels
- d. B This element is a metalloid with two energy levels.
- e. Rn This element is a noble gas with eight electrons in its outer energy level and has 6 energy levels.
- f. S This is an element with properties very similar to oxygen and three energy levels.
- g. B This a metalloid in a family where all the other elements are metals.

4. Use the graph shown here to answer the questions.

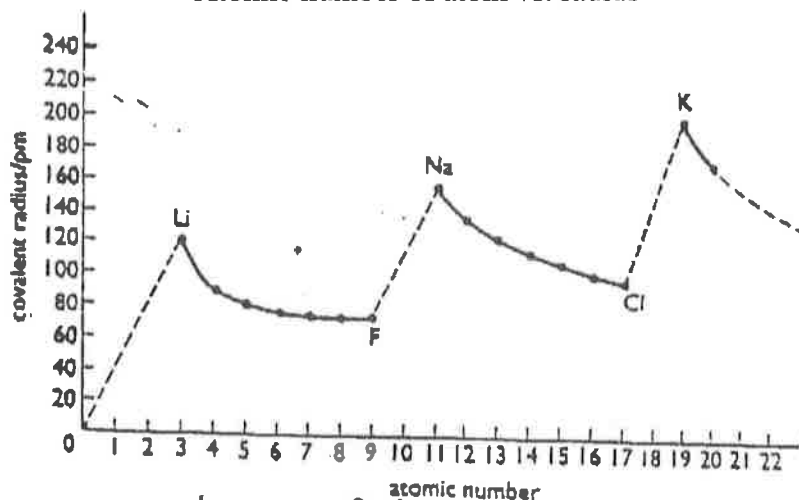
a. How does the radius change as you move left to right across the periodic table? Top to bottom?

L to R radius ↓
T to B radius ↑

b. Suggest a reasonable explanation for these observations using the number of valence electrons.

- L to R radius ↓ b/c as valence fills the nucleus pulls stronger + e^- move in closer.
- T to B radius ↑ b/c the # of valence e^- stays the same but # energy levels increases.

Atomic number of atom vs. radius



Chapter 22 – Chemical Bonding

1. Name the following compounds:

- K_2O Potassium oxide
- NH_4OH ammonium hydroxide
- PCl_3 phosphorus trichloride
- $CuSO_4$ copper (II) sulfate
- $Pb(NO_3)_2$ lead (II) nitrate

- $KC_2H_3O_2$ potassium acetate
- $BaBr_2$ barium bromide
- Se_2Br_5 diselenium pentabromide
- $FrCl$ francium chloride

1. Write the formula for the following compounds:

- Calcium iodide CaI_2
- Potassium bicarbonate $KHCO_3$
- Nitrogen trifluoride NF_3
- Ammonium perchlorate NH_4ClO_4
- Nickel(II) phosphide Ni_3P_2

- Silicon dioxide SiO_2
- Magnesium nitrate $Mg(NO_3)_2$
- Iron(III) oxide Fe_2O_3
- Iron(II) oxide FeO

3. List the seven diatomic elements



4. What are the two main differences between ionic bonding and covalent bonding?

a. ^{covalent bonding} share e^-

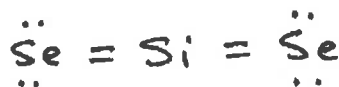
b. nonmetal + nonmetal

a. ^{ionic bonding} donate e^-

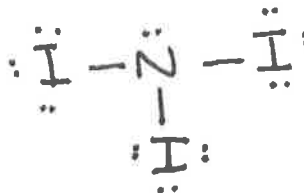
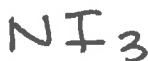
b. metal + nonmetal

5. Write the formula for the following covalent compounds. Then, draw a Bohr Diagram and Lewis Structure to represent each one.

a. Silicon diselenide



b. nitrogen triiodide

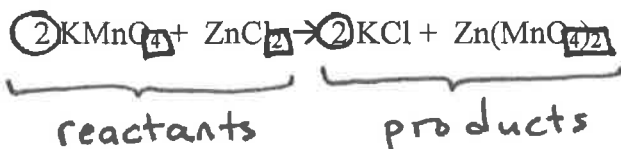


Chapter 23 – Chemical Reactions

1. What is the law of Conservation of Mass? Who is credited with discovering it? What significance does it have when writing formulas and balancing equations?

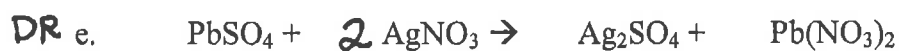
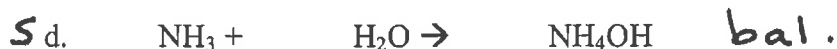
Matter is neither created nor destroyed during a chemical rxn. (Antoine Lavoisier) Equations are balanced to show that all atoms that are reactants are present in products.

2. Identify the reactants and products in the equation shown here. Circle coefficients and put a box around subscripts.

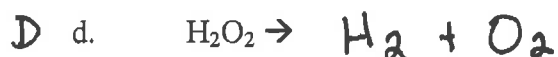
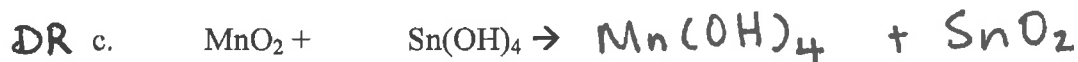


3. Balance the equations. Identify the type of reaction (S, D, SR, DR, N). Some may not fit our rxn types.

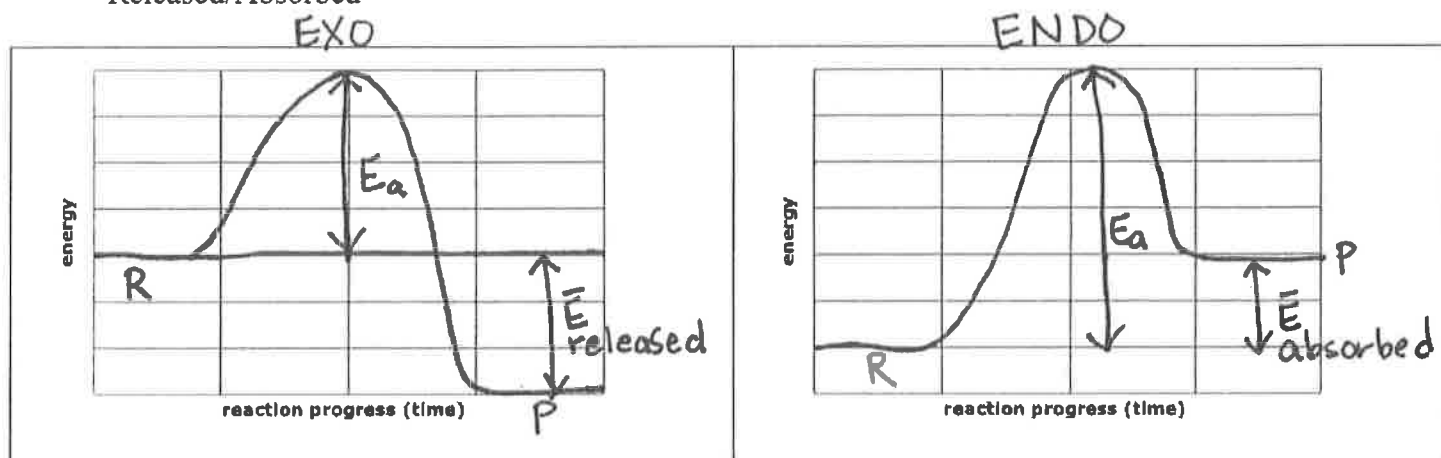




3. Predict the products and balance the equations Identify the type of reaction



4. Draw two graphs of energy versus reaction progress (time) one to show endothermic and the other to show exothermic reactions. Label the E_a , Transition State, Reactants, Products, Energy Released/Absorbed



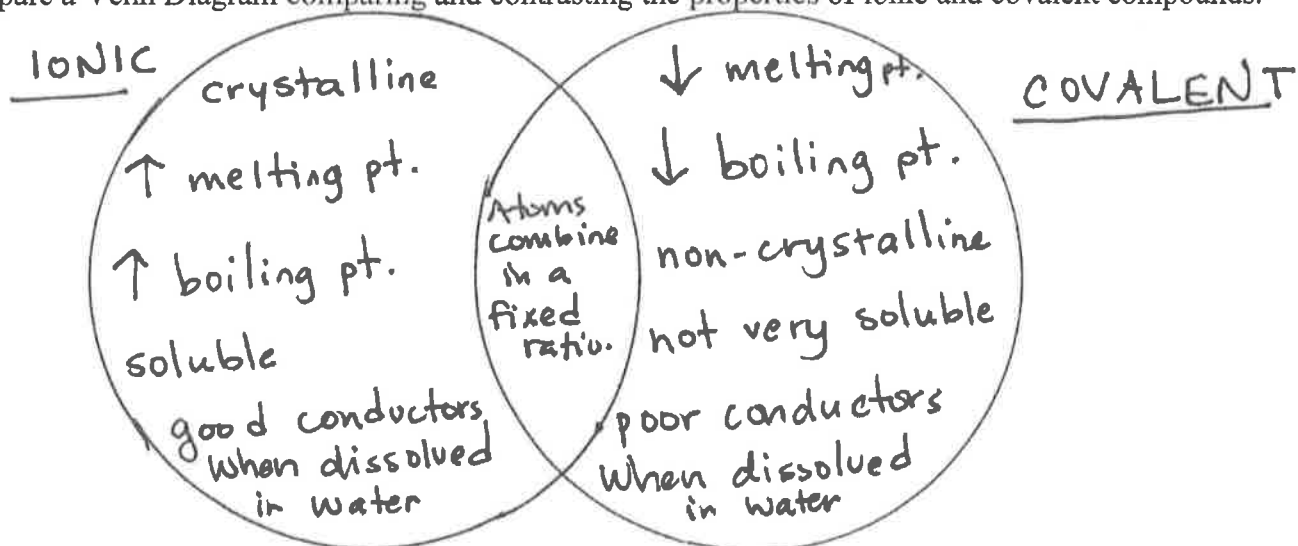
5. Write a balanced equation, with correct formulas for the word equation shown here.

iron(III) sulfate + lead(II) nitrate yields iron(III) nitrate + lead(II) sulfate



Chapter 24 – Chemical Compounds

1. Prepare a Venn Diagram comparing and contrasting the properties of ionic and covalent compounds.



2. Identify each of the following as acid = A, base = B, salt = S or none of these = N



3. Complete and balance the following neutralization reactions.



4. Write the word equation for a neutralization reaction



5. Describe what pH measures, what it means, the range and how to interpret it.

pH measures H^+ concentration. It ranges from 0 to 14, with acids at 0-6.9, neutral is 7, and bases are 7.1-14. Acids have higher H^+ concentration + bases are lower.

6. Compare the properties of acids and bases.

Acids are sour, react w/ metals to form carbonates & turn blue litmus red. Bases are bitter + slippery. They turn red litmus blue.

Chapter 4 – Heredity

1. Peas can both cross-pollinate and self-pollinate. Why was this a key factor in Mendel's work?

This allowed Mendel to control which peas crossed with which. He did this by removing stamens + using a paintbrush to transfer pollen from one true-breeding plant to another

2. Matching

<u>I</u> dominant trait	A. an organism's appearance
<u>D</u> F ₁ generation	B. an organism with two of the same alleles for a trait
<u>F</u> recessive trait	C. a version of a gene
<u>K</u> gene	D. offspring produced after crossing two parents (P)
<u>C</u> allele	E. an organism with two different alleles for a trait
<u>J</u> F ₂ generation	F. trait that reappears in the 2 nd generation after crossing 2 true-breeding parents
<u>H</u> genotype	G. used to organize all possible offspring combinations
<u>A</u> phenotype	H. genetic makeup formed from both inherited alleles together
<u>G</u> Punnett square	I. trait seen in the 1 st generation after crossing 2 true-breeding parents
<u>B</u> homozygous	J. offspring produced after crossing two F ₁
<u>E</u> heterozygous	K. instructions for traits passed from parent to offspring

3. A rabbit body cell has 80 chromosomes. How many....

Chromosomes are there in the rabbit's cheek cell? 80

Chromosomes are there in the rabbit's sperm cell? 40

Chromatids are there in the rabbit's cheek cell at the onset of prophase? 160

Chromatids are there in the rabbit's egg cell at the onset of prophase II? 80

Duplicated chromosomes are there in the rabbit's egg cell at the end of meiosis? 0

Chromosomes are there in the rabbit's eye cell? 80

Homologous pairs are there in the rabbit's eye cell? 40

Sex chromosomes are there in the rabbit's eye cell? 2

Sex chromosomes are there in the rabbit's sperm cell? 1

4. Use the word bank to complete the following paragraph. Some terms may be used more than once:

Each human body cell has 46 chromosomes. There are 23 pairs. Each pair is made up of one maternal chromosome and one paternal chromosome. There are 22 pairs of regular chromosomes and 1 pair of sex chromosomes. These determine if we are male or female. Males are XY and females are XX. When females undergo meiosis to make sex cells, each of her eggs receives half of her DNA. All of her eggs receive an X chromosome. When males undergo meiosis to make sex cells, each of his sperm receives half of his DNA. Some of his sperm will get the X chromosome and some will get the Y, and therefore it is the male who determines the sex of the offspring.

X	mitosis
XX	maternal
22	paternal
sex	Eggs
XY	Zygote
1	Fertilization
46	Sperm
Y	Male
23	Meiosis

Egg and sperm unite in the process of fertilization, thus restoring the original number of chromosomes to 46. The zygote, or fertilized egg, then undergoes many rounds of mitosis, which forms the resulting child.

Genetics Problems

5. Round seeds (R) are dominant to wrinkled seeds (r). What are the expected genotypic and phenotypic ratios if a true-breeding round (RR) and wrinkled (rr) are crossed? Use punnett squares to support your answer.

	R	R
r	Rr	Rr
r	Rr	Rr

100% Rr
100% round

6. In aliens, there are 2 alleles for antennae shape. The curly allele (C) and the straight allele (S) are inherited in an incompletely dominant manner. The heterozygote has wavy antennae. What are the expected genotypic and phenotypic ratios if a true-breeding curly (CC) and straight (SS) are crossed?

	C	C
S	CS	CS
S	CS	CS

100% CS
100% wavy

7. In the same aliens, skin color is inherited in a codominant manner. What would you expect if you crossed a homozygous purple alien (PP) with a homozygous green alien (GG)?

	P	P
G	PG	PG
G	PG	PG

100% PG
100% purple + green striped

8. In humans, hemophilia is a sex-linked trait. If a female who is a carrier for hemophilia marries a male with normal blood clotting, what fraction of the female children will have hemophilia?

$$X^H X^h \times X^H Y$$

	X^H	X^h
X^H	$X^H X^H$	$X^H X^h$
Y	$X^H Y$	$X^h Y$

0% of the female children will have hemophilia