

CHEMISTRY STUDY GUIDE:

TOPICS:

1. Matter
 2. Properties of Matter
 3. The Atom
 4. The Periodic Table
 5. Electron Configuration
 6. Chemical Bonding
 7. Formula Mass
 8. Chemical Reactions
 9. Balancing Chemical Equations
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Concepts & Vocabulary

1. Matter

- Matter
- Kinetic Theory
- Phases and phase change
 - solid, liquid, gas, plasma
 - melting, evaporation, condensation, sublimation, deposition
- Pure Substance
 - compound
 - molecule
 - element
 - atom
- Mixture
 - homogeneous
 - heterogeneous

2. Properties of Matter

- Solids
 - density
 - hardness
 - elasticity
 - brittleness
 - malleability
 - tensile strength
 - melting point
 - magnetism
 - solubility
- Liquids
 - density
 - viscosity
 - magnetism
 - boiling point
 - freezing point
- Gases
 - pressure
 - condensation point

3. The Atom

- History
 - Idea of the atom
 - Democritus
 - Billiard Ball Model
 - John Dalton

- Plumb Pudding Model
 - JJ Thompson
- Solar System Model
 - Rutherford
 - Bohr
- Electron Cloud Model
 - Heisenburg
 - Shrodinger
- Structure
 - Nucleus
 - protons
 - neutrons
 - Electrons
 - energy levels
 - valence electrons
 - Bohr Diagram
 - Lewis Dot Diagram

4. The Periodic Table

- History
 - Mendeleev, Meyer, Mosely
- The Periodic Law
- Organization
 - periods
 - groups (families)
 - element square
 - chemical symbol
 - atomic number
 - avg. atomic weight
 - isotopes
- Patterns
 - periods: same # of shells
 - families: 1-2, 13-18 have same # of val. e-
- Classification
 - staircase
 - metal = left
 - nonmetal = right
 - metalloid = along
 - classes
 - main
 - transition
 - rare earth

5. Electron Configuration

- Quantum Model of the Atom
 - Heisenberg and Schrodinger
- Electron Quantum Numbers
 - n, l, m_l, m_s
 - Pauli Exclusion Principle
 - orbitals: s, p, d, f
- Electron Configuration
 - Aufbau Diagram
 - short hand notation
- Orbital Diagrams
 - Pauli Exclusion Principle
 - Hund's Rule
- Periodic Table Patterns

6. Chemical Bonding

- The Octet Rule
- Types of Bonds
 - Ionic Bonding
 - Covalent Bonding
 - Metallic Bonding

7. Formula Mass

- Interpreting a Chemical Formula
- Calculating Formula Mass

8. Chemical Reactions

- Terminology
 - Reactants
 - Products
- Reaction Types
 - Addition
 - Decomposition
 - Single-Displacement
 - Double Displacement
 - Combustion

9. Balancing Chemical Equations

- Law of Conservation of Mass
 - Reactants Mass = Products Mass
- Balancing Chemical Reactions

5. Electron Configuration

- Aufbau Diagram
- Orbital diagrams showing electron spin

6. Chemical Bonding

- Ionic Bonding
 - Lewis Dot Diagrams w/ arrows
- Covalent Bonding
 - Lewis Dot Diagrams w/ circles

Graphs / Charts

- Phases of matter: phase, shape, volume, kinetic energy

Problems / Calculations

3. The Atom

- Calculate protons, neutrons, electrons from periodic table data

4. The Periodic Table

- Calculate valence electrons
- Determine metal, nonmetal, metalloid
- Determine valence electrons of an element

5. Electron Configuration

- Determine electron configuration of an element
- Determine valence electrons from electron configurations

6. Chemical Bonding

- Given 2 elements, determine bonding and chemical formula of molecule formed

7. Formula Mass

- Calculate formula mass of a compound

8. Chemical Reactions

- Identify chemical reaction types

9. Balancing Chemical Equations

- Balance chemical equations by using coefficients in front of compounds

Diagrams

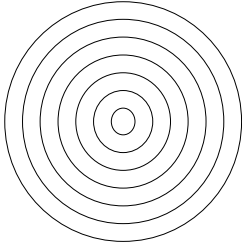
3. The Atom

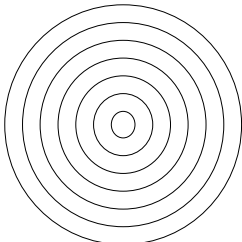
- Various atomic models
- Atom structure model
- Bohr Diagrams
- Lewis Dot Diagrams

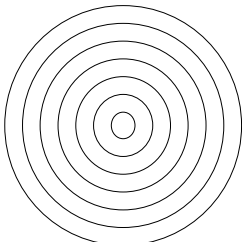
4. The Periodic Table

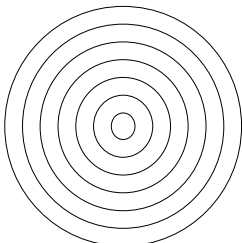
- Atomic structure model of isotopes
- Organization of the Periodic Table

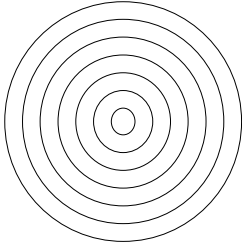
ELECTRON CONFIGURATION PRACTICE

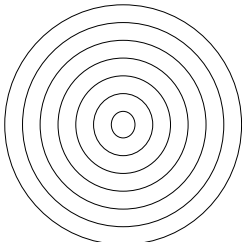
1. Element:	A) # of Electrons:	D) Bohr Diagram: (some shells may not be used) 
B) Electron configuration (use multiple lines if necessary): _____		
C) Electrons in each energy level: 1 st ____ 2 nd ____ 3 rd ____ 4 th ____ 5 th ____ 6 th ____ 7 th ____	F) Lewis Dot Diagram:	
E) Number of valence electrons:		

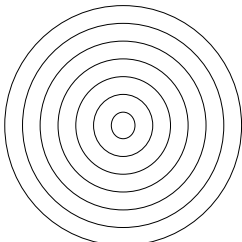
2. Element:	A) # of Electrons:	D) Bohr Diagram: (some shells may not be used) 
B) Electron configuration (use multiple lines if necessary): _____		
C) Electrons in each energy level: 1 st ____ 2 nd ____ 3 rd ____ 4 th ____ 5 th ____ 6 th ____ 7 th ____	F) Lewis Dot Diagram:	
E) Number of valence electrons:		

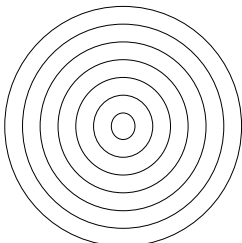
3. Element:	A) # of Electrons:	D) Bohr Diagram: (some shells may not be used) 
B) Electron configuration (use multiple lines if necessary): _____		
C) Electrons in each energy level: 1 st ____ 2 nd ____ 3 rd ____ 4 th ____ 5 th ____ 6 th ____ 7 th ____	F) Lewis Dot Diagram:	
E) Number of valence electrons:		

4. Element:	A) # of Electrons:	D) Bohr Diagram: (some shells may not be used) 
B) Electron configuration (use multiple lines if necessary): _____		
C) Electrons in each energy level: 1 st ____ 2 nd ____ 3 rd ____ 4 th ____ 5 th ____ 6 th ____ 7 th ____	F) Lewis Dot Diagram:	
E) Number of valence electrons:		

5. Element:	A) # of Electrons:	D) Bohr Diagram: (some shells may not be used) 
B) Electron configuration (use multiple lines if necessary): _____		
C) Electrons in each energy level: 1 st _____ 2 nd _____ 3 rd _____ 4 th _____ 5 th _____ 6 th _____ 7 th _____	F) Lewis Dot Diagram:	
E) Number of valence electrons:		

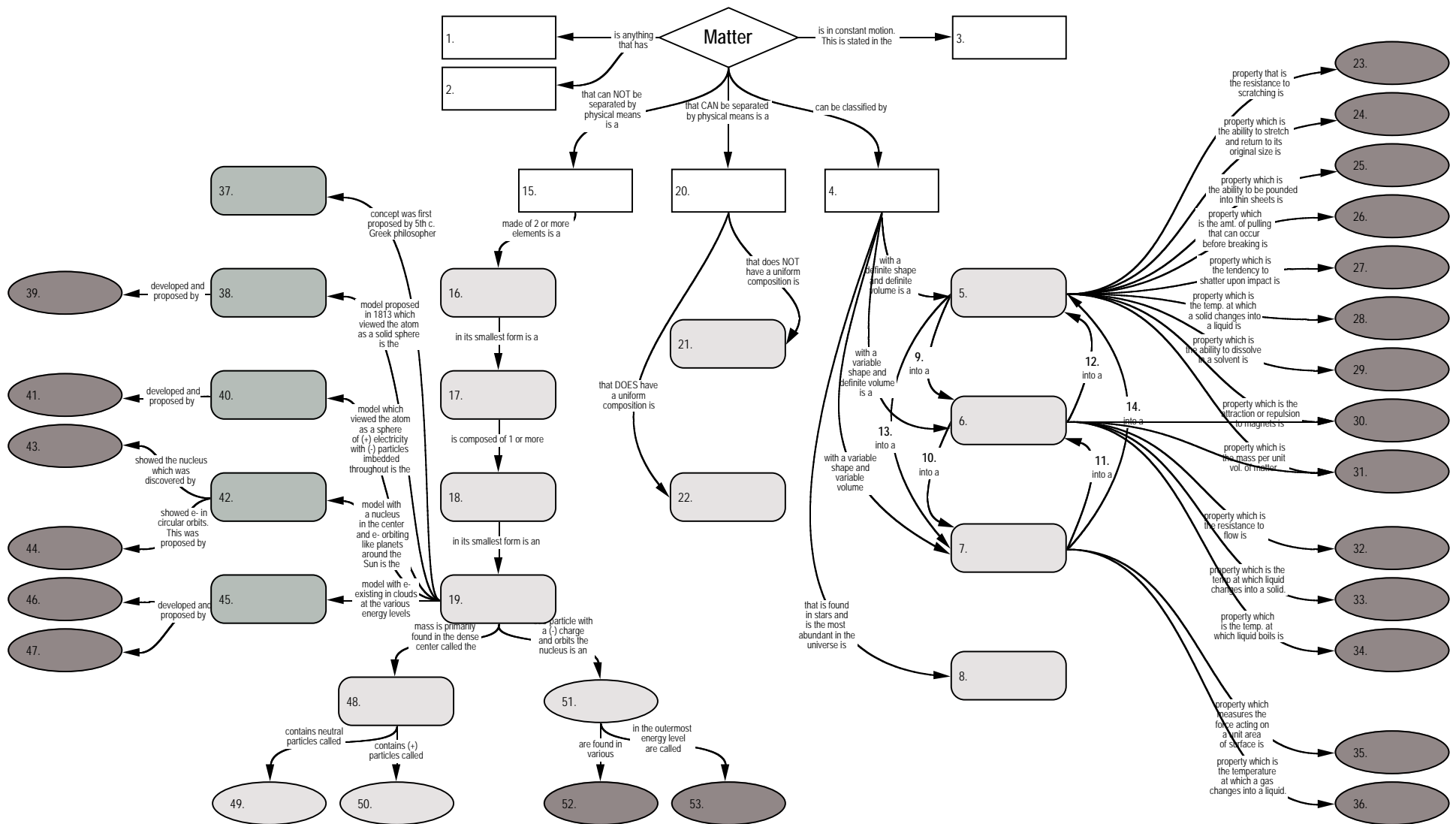
6. Element:	A) # of Electrons:	D) Bohr Diagram: (some shells may not be used) 
B) Electron configuration (use multiple lines if necessary): _____		
C) Electrons in each energy level: 1 st _____ 2 nd _____ 3 rd _____ 4 th _____ 5 th _____ 6 th _____ 7 th _____	F) Lewis Dot Diagram:	
E) Number of valence electrons:		

7. Element:	A) # of Electrons:	D) Bohr Diagram: (some shells may not be used) 
B) Electron configuration (use multiple lines if necessary): _____		
C) Electrons in each energy level: 1 st _____ 2 nd _____ 3 rd _____ 4 th _____ 5 th _____ 6 th _____ 7 th _____	F) Lewis Dot Diagram:	
E) Number of valence electrons:		

8. Element:	A) # of Electrons:	D) Bohr Diagram: (some shells may not be used) 
B) Electron configuration (use multiple lines if necessary): _____		
C) Electrons in each energy level: 1 st _____ 2 nd _____ 3 rd _____ 4 th _____ 5 th _____ 6 th _____ 7 th _____	F) Lewis Dot Diagram:	
E) Number of valence electrons:		

NAME:
DATE:
BLOCK:

CHEMISTRY A - Matter, Properties of Matter, and the Atom



1	1A	1	2	13	14	15	16	17	18									
1	1A	1	2	3A	4A	5A	6A	7A	8A									
1	H Hydrogen 1.01								He Helium 4.00									
2	Li Lithium 6.94	Be Beryllium 9.01																
3	Na Sodium 22.99	Mg Magnesium 24.31																
4	K Potassium 39.10	Ca Calcium 40.08	Sc Scandium 44.96	Ti Titanium 47.87	V Vanadium 50.94	Cr Chromium 52.00	Mn Manganese 54.94	Fe Iron 55.85	Co Cobalt 58.93	Ni Nickel 58.69	Cu Copper 63.55	Zn Zinc 65.39	Ga Gallium 69.72	Ge Germanium 72.61	As Arsenic 74.92	Se Selenium 78.96	Br Bromine 79.90	Kr Krypton 83.80
5	Rb Rubidium 85.47	Sr Strontium 87.62	Y Yttrium 88.91	Zr Zirconium 91.22	Nb Niobium 92.91	Mo Molybdenum 95.94	Tc Technetium (98)	Ru Ruthenium 101.07	Rh Rhodium 102.91	Pd Palladium 106.42	Ag Silver 107.87	Cd Cadmium 112.41	In Indium 114.82	Sn Tin 118.71	Sb Antimony 121.76	Te Tellurium 127.60	I Iodine 126.90	Xe Xenon 131.29
6	Cs Cesium 132.91	Ba Barium 137.33	La Lanthanum 138.91	Hf Hafnium 178.49	Ta Tantalum 180.95	W Tungsten 183.84	Re Rhenium 186.21	Os Osmium 190.23	Ir Iridium 192.22	Pt Platinum 195.08	Au Gold 196.97	Hg Mercury 200.59	Tl Thallium 204.38	Pb Lead 207.2	Bi Bismuth 208.98	Po Polonium (209)	At Astatine (210)	Rn Radon (222)
7	Fr Francium (223)	Ra Radium (226)	Ac Actinium (227)	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (266)	Bh Bohrium (264)	Hs Hassium (269)	Mt Meitnerium (268)									
				Ce Cerium 140.12	Pr Praseodymium 140.91	Nd Neodymium 144.24	Pm Promethium (145)	Sm Samarium 150.36	Eu Europium 151.96	Gd Gadolinium 157.25	Tb Terbium 158.93	Dy Dysprosium 162.50	Ho Holmium 164.93	Er Erbium 167.26	Tm Thulium 168.93	Yb Ytterbium 173.04	Lu Lutetium 174.97	
				Th Thorium 232.04	Pa Protactinium 231.04	U Uranium 238.03	Np Neptunium (237)	Pu Plutonium (244)	Am Americium (243)	Cm Curium (247)	Bk Berkelium (247)	Cf Californium (251)	Es Einsteinium (252)	Fm Fermium (257)	Md Mendelevium (258)	No Nobelium (259)	Lr Lawrencium (262)	

Key

11 — Atomic number
Na — Element symbol
 Sodium — Element name
 22.99 — Average atomic mass*

* If this number is in parentheses, then it refers to the atomic mass of the most stable isotope.