11/5/14

Nuclear Homework:

1. bonds
2. protons + neutrons
3. glue / repelling
4. strong nuclear force
5. unstable
6. alpha decay $^{4}_{2}\alpha^{2+}$
7. Beta decay $^{0}_{-1}\beta^{1-}$
8. high speed e^-
9. Nuclear decay
10. gamma radiation

1. T
2. F alpha
3. F Split
4. T
5. T

1. $^{185}_{79}Au \rightarrow {}^{4}_{2}\alpha^{2+} + \boxed{^{181}_{77}Ir}$
2. $^{238}_{92}U \rightarrow {}^{4}_{2}\alpha^{2+} + \boxed{^{234}_{90}Th}$
3. $^{213}_{85}At \rightarrow {}^{4}_{2}\alpha^{2+} + \boxed{^{209}_{83}Bi}$

4. $^{24}_{11}Na \rightarrow {}^{0}_{-1}\beta^{1-} + \boxed{^{24}_{12}Mg}$

5. $^{14}_{6}C \rightarrow {}^{0}_{-1}\beta^{1-} + \boxed{^{14}_{7}N}$

6. $^{50}_{22}Ti \rightarrow {}^{0}_{-1}\beta^{1-} + \boxed{^{50}_{23}V}$

Alpha decay loses 2p + 2n (moves back 2 elements on PT)
Beta decay gain 1p + 1e⁻ (moves forward one element on PT)

Elements	#p (atomic #)	#e⁻ (if neutral p = e⁻)	(period #) Total # of energy levels	(max 2e⁻) # e⁻ in energy level 1	(max 8e⁻) # e⁻ in energy level 2	# e⁻ in energy level 3
Hydrogen H	1	1	1	1		
Neon Ne	10	10	2	2	8	
Silicon Si	14	14	3	2	8	4
Argon Ar	18	18	3	2	8	8

Name:_____ Block: ___ Date: _____

Homework: Chapter 5 Review

Chapter 5 Test Format: 25 multiple choice, 5 vocabulary matching, 5 scientist matching, 5 p, n, e chart, 2 average atomic weight, and 3 nuclear reactions.

Complete the following multiple choice questions.

A 1. **How many protons, neutrons, and electrons are in a neutral atom of sodium?**

(A) 11 p^+, 12 n°, 11 e^-
B 11 p^+, 11 n°, 12 e^-
C 12 p^+, 11 n°, 12 e^-
D 12 p^+, 11 n°, 11 e^-

neutral means p^+ and e^- must be equal
of p^+ = atomic

B 2. **Which of the following describes what takes place when iron (Fe^0) becomes Fe^{2+} ions?**

A A gain of two electrons
(B) A loss of two electrons
C A gain of two protons
D A loss of two protons

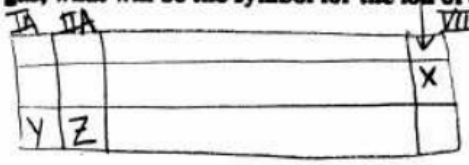
to become 2+ two (electrons) negative particles must be lost

D 3. **Which scientist was the first to conclude through experimentation that atoms have positive charges in their nuclei?**

A Bohr
B Dalton
C Mosley
(D) Rutherford

D 4. **Three elements, X, Y, and Z, have consecutive increasing atomic numbers. If element X is a noble gas, what will be the symbol for the ion of element Z in its compounds?**

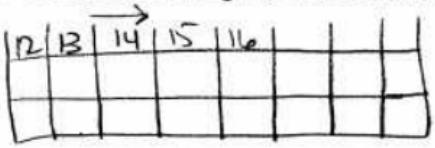
A Z^{2-}
B Z^-
C Z^+
(D) Z^{2+}



← periodic table
IIA elements form 2+ ions

A 5. **From left to right across a period, what change is occurring within the atomic nuclei?**

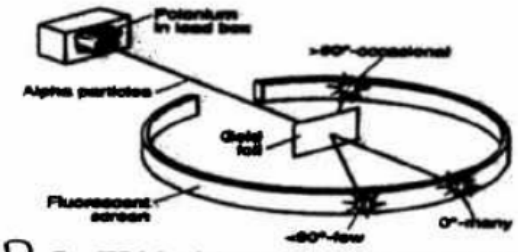
(A) A proton is gained.
B An electron is gained.
C A neutron is lost.
D The electron cloud size is decreasing.



B 6. **Radioactive iodine-131 has a half-life of eight days. The amount of a 200.0 gram sample left after 32 days would be —**

A 6.25 g
(B) 12.5 g
C 25.0 g
D 50.0 g

Time	Mass
0	200.0g
8	100.0g
16	50.0g
24	25.0g
32	12.5g



D 7. **Which of these conclusions can be drawn from Rutherford's experiment?**
- A Each atom contains electrons.
- B The nucleus of an atom can be split.
- C Each atom contains protons.
- (D) Atoms are mostly empty space.

C 8. **How does the radioactive isotope C-14 differ from its stable counterpart C-12?**
- A It has a different number of protons and two less neutrons than C-12.
- B It has the same number of protons and two more electrons than C-12.
- (C) It has the same number of protons but two more neutrons than C-12.
- D It has a different number of protons and two more neutrons than C-12.

Isotopes = same # protons, different # of neutrons

C 9. **Atoms of the same element must —**
- A contain the same number of neutrons
- B have the same mass number
- (C) contain the same number of protons
- D have equal numbers of protons and neutrons

MUST, MUST, MUST — ALWAYS
# of protons = identity of element

D 10. **Chlorine forms a 1– ion. How many electrons does a chloride ion have?**
- A 1
- B 16
- C 17
- (D) 18

neutral chlorine = 17 e⁻
1- ion has gained an e⁻ so 18 e⁻

B 11. **Isotopes of an element have different —**
- A atomic numbers
- (B) atomic masses
- C numbers of protons
- D numbers of outer-shell electrons

when the # of neutrons change it changes the masses

	Protons	Neutrons	Electrons
1	11	12	10
2	1	0	2
3	18	18	18
4	20	20	18

A 12. **Which of these is an ion with a charge of (1+)?**
- (A) 1
- B 2
- C 3
- D 4

(1+) — means one more proton than electrons

C 13. **Which of these elements contains four valence electrons?**

A Helium
B Beryllium
(C) Carbon
D Oxygen

remember you can use periodic table to find
IA IIA IIIA (IVA) VA VIA VIIA VIIIA

C 14. **A neutral atom of aluminum-27 contains —** (mass #)

A 13 protons and 27 electrons
B 14 protons and 13 neutrons
(C) 13 electrons, 13 protons, and 14 neutrons
D 13 electrons, 14 protons, and 13 neutrons

$p^+ + e^-$ must be same
$p^+ + n^\circ$ = mass

A 15. **Cations are formed when neutral atoms lose —**

(A) electrons
B protons
C neutrons
D positrons

cation = positive ion
↑ see positive sign
to be positive there are more p^+ than e^-

A 16. **The atomic number corresponds to an atom's number of —**

(A) protons
B neutrons
C electrons
D positrons

B 17. **How many valence electrons does a neutral atom of silicon have?**

A 3
(B) 4
C 5
D 6

find silicon on periodic table — it's a IVA so vale⁻ = 4

Element	Protons	Neutrons	Electrons
1	20	20	20
2	40	40	40
3	20	10	10
4	20	20	40

A 18. **Which represents an atom of calcium?**

(A) 1
B 2
C 3
D 4

Atomic # = # of protons
$p^+ = e^-$ if neutral
mass # = $p^+ + n^\circ$

B 19. **A scientist has found the following isotope of oxygen:**

$^{19}_{8}O$

How many neutrons are present in this isotope?

A 8
(B) 11
C 19
D 27

19 ← mass #
8 ← Atomic #
> subtract to find neutrons

D 20. **The net charge on an aluminum ion is 3 because there are —**

A 10 protons and 13 electrons in the atom
B 13 protons and 10 neutrons in the nucleus
C 10 neutrons and 13 electrons in the atom
(D) 13 protons and 10 electrons in the atom

Charge = #p − #e
3+ = 13 − #e #e = 10

D 21. **One indicator that electrons in atoms are limited to specific energy levels is that —**

A atoms move faster when heated
B the light given off by atoms is all at the same wavelength
C the Doppler effect shows a shift in wavelength for H-atom light
(D) light emitted from excited atoms gives off specific amounts of energy ← remember Bohr's studies

A 22. **Which of the following describes a proton?**

(A) charge of 1+ and a mass of 1 amu
B charge of 1+ and no mass
C No charge and a mass of 1 amu
D No charge and no mass

	mass	charge
p	1	+
n	1	0
e	0	1−

B 23. **Which of the following would represent an isotope of:**

$^{56}_{30}X$ ____ isotopes must have same atomic #

A $^{52}_{29}X$ B $^{57}_{30}X$ C $^{59}_{31}X$ D $^{56}_{29}X$

Fill in the following chart for the scientists that discovered the atom and its parts.

Scientist	What he found.	His Experiment	How you are going to remember it.
24. Bohr	Energy levels	Spectrum analysis	Bohr-ring
25. Millikan	Size of the electron	oil drops	oil not milk
26. Rutherford	atom is mostly space & pos. nucleus	Gold Foil	Au can't afford Gold
27. J Thompson	named electron	Cathode Ray Tubes	Thompson Tubes
28. Dalton	Atomic theory of matter	———	Daddy Dalton

Complete the following "p, n, e" chart.

	Name	Symbol	Atomic Number	Mass Number	Protons	Neutrons	Electrons
29.	Carbon-13	$^{13}_{6}C$	6	13	6	7	6
30.	Chlorine-35	$^{35}_{17}Cl^{1-}$	17	35	17	18	18
31.	Zinc-67	$^{67}_{30}Zn$	30	67	30	37	30
32.	Oxygen-17 2- ion	$^{17}_{8}O^{2-}$	8	17	8	9	10
33.	Sulfur-34	$^{34}_{16}S$	16	34	16	18	16

Determine the average atomic weight of the following elements.

34. Zinc:

$^{64}_{30}Zn$ 48.89%
$^{66}_{30}Zn$ 27.81%
$^{67}_{30}Zn$ 4.11%
$^{68}_{30}Zn$ 18.57%
$^{70}_{30}Zn$ 0.62%

35. Sulfur:

$^{32}_{16}S$ 95.002%
$^{33}_{16}S$ 0.76%
$^{34}_{16}S$ 4.22%
$^{36}_{16}S$ 0.014%

(34) $\frac{(64 \times 48.89\%) + (66 \times 27.81\%) + (67 \times 4.11\%) + (68 \times 18.57\%) + (70 \times 0.62\%)}{100} =$ 65.46 ave. atomic mass

(35) $\frac{(32 \times 95.002\%) + (33 \times 0.76\%) + (34 \times 4.22\%) + (36 \times 0.014\%)}{100} =$ 32.09 ave. atomic mass

Write the nuclear reaction equations for the following elements.

35. The alpha decay of neptunium-237 (Np).

$^{237}_{93}Np \rightarrow {}^{233}_{91}Pa + {}^{4}_{2}\alpha$

36. The beta decay of radium-227 (Ra).

$^{227}_{88}Ra \rightarrow {}^{227}_{89}Ac + {}^{0}_{-1}\beta$