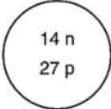
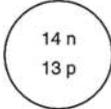
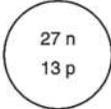
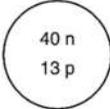


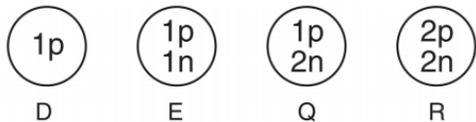
Atomic History & Structure MC Practice

Question & Answer	Brief Explanation/Work
<p>1. Which sequence represents a correct order of historical developments leading to the modern model of the atom?</p> <p>a. The atom is a hard sphere → most of the atom is empty space → electrons exist in orbitals outside the nucleus</p> <p>b. The atom is a hard sphere → electrons exist in orbitals outside the nucleus → most of the atom is empty space</p> <p>c. Most of the atom is empty space → electrons exist in orbitals outside the nucleus → the atom is a hard sphere</p> <p>d. Most of the atom is empty space → the atom is a hard sphere → electrons exist in orbitals outside the nucleus</p>	<p>(include the names of the models)</p>
<p>2. The gold foil experiment led to the conclusion that each atom in the foil was composed mostly of empty space because most alpha particles directed at the foil</p> <p>a. Remained trapped in the foil</p> <p>b. Were deflected by the nuclei in the gold atoms</p> <p>c. Were deflected by the electrons in the gold atoms</p> <p>d. Passed through the foil</p>	
<p>3. The nucleus is the part of the atom that</p> <p>a. Consists mostly of empty space</p> <p>b. Has a negative charge</p> <p>c. Occupies most of the atom's total volume</p> <p>d. Contains most of the atom's total mass</p>	
<p>4. What is the atomic number of an element whose atoms each contain 47 protons, 60 neutrons, and 47 electrons?</p> <p>a. 13 b. 47 c. 60 d. 107</p>	

<p>5. What is the mass number of an atom which contains 21 electrons, 21 protons, and 24 neutrons?</p> <p>a. 21 b. 42 c. 45 d. 66</p>							
<p>6. Every chlorine atom has</p> <p>a. 7 electrons b. 17 neutrons c. A mass number of 35 d. An atomic number of 17</p>							
<p>7. The diagram below represents the nucleus of an atom</p> <div style="display: flex; align-items: center;"> <table border="1" style="margin-right: 20px;"> <thead> <tr> <th colspan="2">Key</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">●</td> <td>= proton</td> </tr> <tr> <td style="text-align: center;">○</td> <td>= neutron</td> </tr> </tbody> </table>  </div> <p>What are the atomic number and mass number of this atom?</p> <p>a. The atomic number is 9 and the mass number is 19 b. The atomic number is 9 and the mass number is 20 c. The atomic number is 11 and the mass number is 19 d. The atomic number is 11 and the mass number is 20</p>	Key		●	= proton	○	= neutron	
Key							
●	= proton						
○	= neutron						
<p>8. The nucleus of an atom contains 8 protons and 6 neutrons. The total number of electrons present in a neutral atom of this element is</p> <p>a. 6 b. 2 c. 8 d. 14</p>							
<p>9. A particle of matter contains 6 protons, 7 neutrons, and 6 electrons. This must be a</p> <p>a. Neutral carbon atom b. Neutral nitrogen atom c. Positively charged carbon ion d. Positively charged nitrogen ion</p>							
<p>10. What is the total number of protons and neutrons in the nuclide, ${}^{80}_{35}\text{Br}$?</p> <p>a. 35 b. 45 c. 80 d. 115</p>							
<p>11. What is the total number of neutrons in an atom of O-18?</p> <p>a. 18 b. 16 c. 10 d. 8</p>							

<p>12. Which diagram represents the nucleus of an atom of ${}_{13}^{27}\text{Al}$?</p> <p>A.  B.  C.  D. </p>	
<p>13. Which of the following atoms has the greatest nuclear charge?</p> <p>a. ${}_{7}^{14}\text{N}$ b. ${}_{6}^{12}\text{C}$ c. ${}_{1}^{2}\text{H}$ d. ${}_{2}^{4}\text{He}$</p>	
<p>14. Which ion contains the same total number of electrons as Cl^{1-}?</p> <p>a. S^{2-} b. Br^{1-} c. Mg^{2+} d. Na^{1+}</p>	
<p>15. A Ca^{2+} ion differs from a Ca atom in that the Ca^{2+} ion has</p> <p>a. More protons b. Fewer protons c. More electrons d. Fewer electrons</p>	
<p>16. As the number of neutrons in the nucleus of a given atom of an element increases, the atomic number of that element</p> <p>a. decreases b. increases c. remains the same</p>	
<p>17. Compared to an atom of phosphorus-31, an atom of sulfur-32 contains</p> <p>a. One less neutron b. One less proton c. One more neutron d. One more proton</p>	
<p>18. Which pair of atoms are isotopes of element X?</p> <p>A. ${}_{90}^{226}\text{X}$ and ${}_{91}^{226}\text{X}$ B. ${}_{91}^{226}\text{X}$ and ${}_{91}^{227}\text{X}$ C. ${}_{91}^{227}\text{X}$ and ${}_{90}^{227}\text{X}$ D. ${}_{90}^{226}\text{X}$ and ${}_{91}^{227}\text{X}$</p>	

19. Each diagram below represents the nucleus of a different atom.



Which diagrams represent nuclei of the same element?

- a. D and E, only
- b. D, E, and Q
- c. Q and R, only
- d. Q, R, and E

20. A sample of element X contains 90 percent ^{25}X atoms, 5 percent ^{27}X atoms, and 5 percent ^{28}X atoms. The average isotopic mass is closest to

- a. 22 b. 25 c. 27 d. 28

21. Element X has two isotopes. If 72.0% of the has an isotopic mass of 84.9 atomic mass units, and 28.0% of the element has an isotopic mass of 87.0 atomic mass units, the average atomic mass of element X is numerically equal to

- A. $(72.0 + 84.9) \times (28.0 + 87.0)$
- B. $(72.0 - 84.9) \times (28.0 + 87.0)$
- C. $\frac{(72.0 \times 84.9)}{100} + \frac{(28.0 \times 87.0)}{100}$
- D. $(72.0 \times 84.9) + (28.0 \times 87.0)$

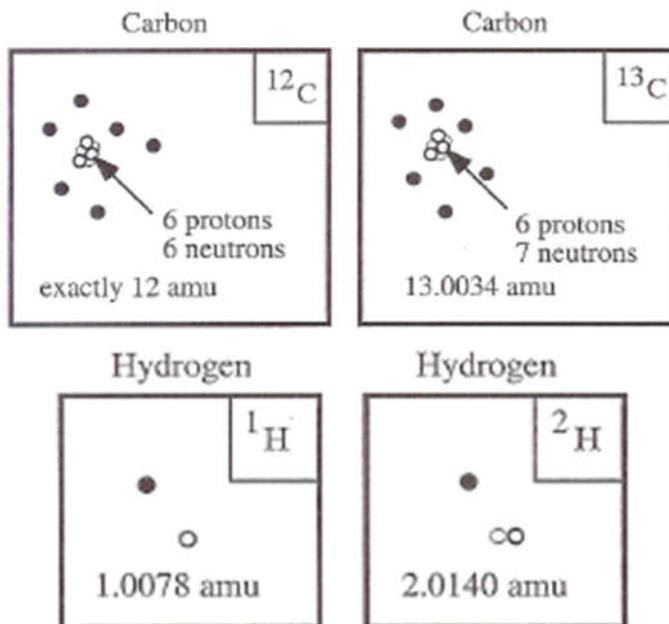
Nuclear Stability WS

Name _____

Period _____

Isotopes

- electron (-)
- proton (+)
- neutron (no charge)



- Isotopes of the same element have the same number of _____ and different number of _____

Nuclear Reaction...

- involves a decay in the nucleus of an atom.
- occur because the nucleus of an atom is unstable

Let's take a closer look inside the nucleus of atoms...(use notes to fill in this part)

- There are 2 subatomic particles in the nucleus:
_____ + _____
- Protons have a _____ charge, whereas neutrons have _____ charge.
- **As atomic # increases...**
 - the # of protons _____,
 - & nuclear charge _____
 - This causes more REPULSIONS within the nucleus.
- Neutrons help _____ by _____ the repulsive forces between protons

Complete the following table and then answer the questions that follow.

Isotope	# neutrons	# protons	# electrons	n/p ratio	Stable/unstable
H-3	2	1	1	$\frac{2}{1} = 2$	Unstable
He-4					stable
C-12					Stable
C-14					Unstable
K-39					Stable
K-42					Unstable
Mn-54					Unstable
Zn-75					Stable
Co-60					Unstable
Au-197					Stable
Po-210					Unstable
Cm-250					Unstable
U-235					Unstable

1. Do the number of electrons affect the stability of the nucleus? Explain.

2. Using the shaded portions of the table above, complete the table below

Atomic Number range	1 to 19	20 to 83	84 and above

Ratio of n/p for stable isotopes			
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PRACTICE:

1. What happens to isotopes that do not fall within the band of stability?
2. For each isotope, calculate the N/P ratio and decide if it should be stable or unstable.

Isotope	# of Protons	# of Neutrons	N/P ratio	Stable or Unstable?
boron-13				
magnesium-24				
calcium-40				
zinc-75				
tin-127				
terbium-159				
mercury-200				

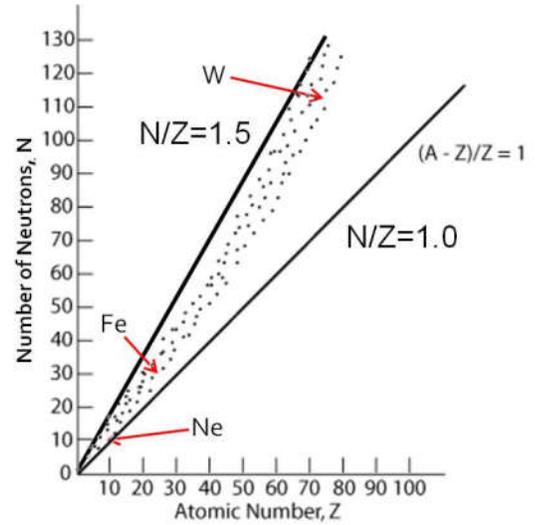
SUMMARY

Nuclear Stability –

-
-

Band of stability

-
-



Radioactivity

- The ratio of protons to neutrons determines this stability.
 - Smaller, stable elements have at least ___ neutron for every proton.
 - Larger, stable elements usually have about ___ neutrons for every ___ protons.

STABLE N:Z Ratios

Hydrogen → Potassium

Calcium → Bismuth

Polonium →