

## CHAPTER 3 BLM ANSWER KEY

### BLM 3-1: Pre-Chapter Quiz

1. b    2. a    3. c    4. c    5. d  
6. c    7. a    8. b    9. b    10. d

### BLM 3-2: Nuclear Model Practice Sheet

- (a) The atomic number is the number of protons in the nucleus of an atom. It is equal to the number of electrons in a neutral atom.  
(b) A proton is a nucleon (a particle found in the nucleus of an atom). A proton has a relative charge of 1+ and a relative mass of approximately 1.  
(c) A neutron is a nucleon (a particle found in the nucleus of the atom). A neutron has no charge and has a relative atomic mass of approximately 1.  
(d) Nucleons are particles that are found in the nucleus of an atom.  
(e) The mass number is equal to the total number of protons and neutrons in the nucleus of an atom. The mass number of the most abundant isotope of an element is equal to the relative atomic mass, rounded to the nearest whole number.

2. Answers are in boldface type.

Element	Z	A	Number of electrons	Number of protons	Number of neutrons
H	1	1	1	1	0
deuterium	1	2	1	1	1
F	9	<b>19</b>	<b>9</b>	<b>9</b>	10
Ni	<b>28</b>	59	28	<b>28</b>	<b>31</b>
Hg	<b>80</b>	<b>201</b>	<b>80</b>	80	121
As	<b>33</b>	75	<b>33</b>	33	<b>42</b>

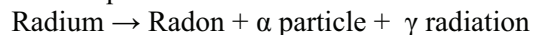
3. (a)  ${}_{19}^{39}\text{K}$     (b)  ${}_{92}^{238}\text{U}$     (c)  ${}_{17}^{35}\text{Cl}$   
(d)  ${}_{88}^{226}\text{Ra}$     (e)  ${}_{26}^{56}\text{Fe}$     (f)  ${}_{84}^{209}\text{Po}$

4. The nucleus of an uranium atom splits and emits an alpha particle (2 protons plus 2 neutrons, mass number 4) to form an thorium atom (90 protons plus 141 neutrons, mass number 231).

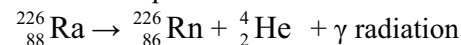
### BLM 3-3: $\alpha$ , $\beta$ , and $\gamma$ Radiation

- The deflections of both  $\alpha$  rays and  $\beta$  rays when they are subjected to electric and magnetic fields suggest that  $\alpha$  and  $\beta$  rays are particles, not a form of electromagnetic radiation.
- The evidence that  $\alpha$  rays have the same m/e ratio as the canal rays produced when helium is in the tube suggests that  $\alpha$  particles are helium nuclei with a 2+ charge,  ${}_{2}^4\text{He}$ . The evidence that  $\beta$  rays have the same m/e ratio as cathode rays implies that  $\beta$  particles are electrons with a 1- charge,  $e^{-}$ .
- The amount of deflection depends on the charge and the mass of the particle. The charge of an  $\alpha$  particle is twice the charge of a  $\beta$  particle, but the mass of an  $\alpha$  particle is over 7000 times the mass of a  $\beta$  particle. Therefore, a  $\beta$  particle is much easier to deflect, even though the force of deflection is greater for an  $\alpha$  particle.

4. Word equation:

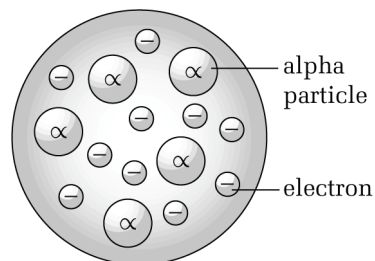


Chemical equation:



5. Parts of the nucleus can split off from the atom. This might suggest that Thomson's atom was made up of  $\alpha$  particles.

6.



## CHAPTER 3 BLM ANSWER KEY

### BLM 3-4: Periodic Table Exercise

Group/Period	1	2	13	14	15	16	17	18
1	<sup>1</sup> F							<sup>2</sup> X
2	<sup>3</sup> P	<sup>4</sup> L	<sup>5</sup> D	<sup>6</sup> U	<sup>7</sup> M	<sup>8</sup> A	<sup>9</sup> V	<sup>10</sup> B
3	<sup>11</sup> S	<sup>12</sup> T	<sup>13</sup> Z	<sup>14</sup> N	<sup>15</sup> C	<sup>16</sup> Q	<sup>17</sup> O	<sup>18</sup> E
4	<sup>19</sup> I	<sup>20</sup> H	<sup>21</sup> R	<sup>22</sup> G	<sup>23</sup> Y	<sup>24</sup> K	<sup>25</sup> W	<sup>26</sup> J

### BLM 3-5: Mini Periodic Table Exercise

Group/Period	1	2	16	17	18
2	M	K	I	B	L
3	A	D	N	E	H
4	F	O	C	J	G

### BLM 3-6: Chapter 3 Test

- d
- b
- c
- d
- a
- c
- d
- c
- a
- d
- a
- c
- d
- b
- b
- c
- a
- c
- d
- b
- d
- d
- b
- d
- b
- d
- a
- c
- a
- b
- d