

AR Final Review Set 5

Carbon Based Chemistry

1. What two elements make up simple hydrocarbons?
2. How many OH groups are in simple sugar ($C_6H_{12}O_6$)
3. What are the names of the following functional groups?
 - a. $C = C$
 - b. $C - OH$
 - c. $COOH$
 - d. $C - NH_2$
 - e. $C - ONH_2$
4. What are the two ends of all proteins?
5. What is a polypeptide?
6. What is a polymer?
7. What types of things are made of polymers?
8. What are the four elements that are the most important biological elements?

Nuclear

1. Give the symbol for each of the following particles:
 - a) proton
 - b) neutron
 - c) electron
 - d) alpha particle
 - e) beta particle
2. Describe the following types of radiation:
 - a) alpha
 - b) beta
 - c) gamma
3. Describe the type of penetration / damage the following types of radiation exhibit:
 - a) alpha
 - b) beta
 - c) gamma
4. Write balanced nuclear equations for the following processes:
 - a) beta decay of bismuth-214
 - b) alpha decay of plutonium-242
5. Decay of which nucleus (eg. uranium-238), results in:
 - a) bismuth-211 by beta decay
 - b) radium-226 by alpha decay
6. What particle is emitted during the following decay processes
 - a) sodium-24 decays to magnesium-24?
 - b) plutonium-242 decays to uranium-238?
7. Describe:
 - a) nuclear fission
 - b) nuclear fusion
8. What is the formula that describes all the energy released by the thermonuclear reaction in the sun?

AR Final Review Set 5 Answers
Carbon Based Chemistry

1. What two elements make up simple hydrocarbons? **C and H**
2. How many OH groups are in simple sugar (C₆H₁₂O₆) **6**
3. What are the names of the following functional groups?
 - a. C = C **alkenes**
 - b. C – OH **alcohols**
 - c. COOH **carboxylic acid**
 - d. C – NH₂ **amine**
 - e. C – ONH₂ **amide**
4. What are the two ends of all proteins? **Amine and carboxylic acid groups**
5. What is a polypeptide? **Many amino acids linked with Amide groups**
6. What is a polymer? **1000's of CH₂ in a row**
7. What types of things are made of polymers? **Plastics, woo, natural rubber**
8. What are the four elements that are the most important biological elements? **C H O N**

Nuclear

1. Give the symbol for each of the following particles:
 - a) proton ${}^1\text{P}^{+1}$
 - b) neutron ${}^1\text{N}^0$
 - c) electron ${}^0\text{e}^{-1}$
 - d) alpha particle ${}^2_2\text{He}$
 - e) beta particle ${}^0\text{e}^{-1}$
2. Describe the following types of radiation:
 - a) alpha **a helium nucleus is emitted, 2 protons and 2 neutrons**
 - b) beta **a neutron “explodes” adding a proton to the nucleus, ejected electron is the beta particle**
 - c) gamma **high energy EMR released from beta radiation**
3. Describe the type of penetration / damage the following types of radiation exhibit:
 - a) alpha **weak, stopped by paper**
 - b) beta **strong, stopped by lead**
 - c) gamma **super strong, passes through the earth**
4. Write balanced nuclear equations for the following processes:
 - a) beta decay of bismuth-214 ${}_{83}^{214}\text{Bi} \rightarrow {}_{84}^{214}\text{Po} + \text{e}^{-1}$
 - b) alpha decay of plutonium-242 ${}_{94}^{242}\text{Pu} \rightarrow {}_{92}^{238}\text{U} + {}_2^4\text{He}$
5. Decay of which nucleus (eg. uranium-298), results in:
 - a) bismuth-211 by beta decay ${}_{82}^{211}\text{Pb} \rightarrow {}_{83}^{211}\text{Bi} + \text{e}^{-1}$
 - b) radium-226 by alpha decay ${}_{90}^{230}\text{Th} \rightarrow {}_{88}^{226}\text{Ra} + {}_2^4\text{He}$
6. What particle is emitted during the following decay processes
 - a) sodium-24 decays to magnesium-24? **beta, at # up 1, mass stays the same**
 - b) plutonium-242 decays to uranium-238? **alpha, at# down 2, mass down 4 (He nucleus)**
7. Describe:
 - a) nuclear fission **neutron breaks apart Uranium atom into 2 different elements, releasing 2 neutrons, that repeat, releasing 4, then 8, etc.**
 - b) nuclear fusion **hydrogen atoms fuse to form helium. Some mass is lost and converted into energy.**

8. What is the formula that describes all the energy released by the thermonuclear reaction in the sun **E=mc²**