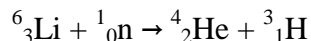


*Chapter 21 and 23 practice problems*

1. A wooden object is claimed to have been found in an Egyptian pyramid and is offered for sale to an art museum. Analysis of the object determines that it contains 35.4 mg of Carbon-14. A fresh sample of the same kind of wood contains 62.1 mg of Carbon-14. Is this object likely to have come from a pyramid from 3500 years ago?
2. How much energy in MJ is release when 1.00 mol of Lithium-6 undergoes the following reaction:



Use the data from your textbook.

3. Balance the following nuclear reactions
  - a.  ${}^{59}_{27}\text{Co} + {}^1_0\text{n} \rightarrow {}^{56}_{25}\text{Mn} + \underline{\hspace{2cm}}$
  - b.  ${}^{235}_{92}\text{U} + {}^1_0\text{n} \rightarrow \underline{\hspace{2cm}} + {}^{135}_{52}\text{Te} + 2 {}^1_0\text{n}$
  - c. Positron emission of Phosphorus-30
4. Which of the following complexes are tetrahedral and which are square planar based on the data provided?
  - a.  $\text{Ni}(\text{en})_2^{2+}$  (diamagnetic)
  - b.  $\text{FeCl}_4^-$  (green color)
  - c.  $\text{Ag}(\text{CO})_4^+$  (low spin)
5. Name the following transition metal complexes or complex ions
  - a.  $[\text{CrBr}_2(\text{NH}_3)_4]^+$
  - b.  $[\text{AlF}_6]^-$
  - c.  $[\text{Fe}(\text{CN})_5(\text{SCN})]^{4-}$
  - d.  $[\text{Ag}(\text{S}_2\text{O}_3)_2]^{3-}$
  - e.  $[\text{Co}(\text{SO}_4)(\text{NH}_3)_5]^+$

6. Write formulas from the following names
  - a. Dicyanoargentate(I) ion
  - b. Pentaquahydroxoaluminum(III) chloride
  - c. Ethylenediaminedithiocyanatocopper(II)
  
7.  $\text{Cr}(\text{en})_3^{2+}$  is low spin, what sort of hybridization does it have?
  
8.  $\text{Fe}(\text{NO}_2)_2(\text{en})_2$  is polar, does it have optical isomers?
  
9.  $\text{MoCl}_2(\text{H}_2\text{O})_2^+$  is non-polar, does it have geometric isomers?
  
10. A compound with the overall formula  $\text{CoCl}_6 \cdot 3\text{H}_2\text{O}$  is dissolved in water. Electrical conductivity measurements indicate that there are 3 ions per formula unit. Gentle heating of the compound results in a slight mass loss. X-ray crystallography measurements indicate that the Cobalt has octahedral geometry. Write a formula for this compound indicating what the ligands are, what the anions are and if how many waters of hydration there are. (i.e.  $[\text{ML}_{1n}\text{L}_{2m}]\text{A}_y \cdot x\text{H}_2\text{O}$ )