1) A quantity of 7.480g of an organic compound is dissolved in water to make 300.0 mL of solution. The solution has an osmotic pressure of 1.43 atm at 27 degrees Celsius. The analysis of this compound shows that it contains 41.8 percent C, 4.7 percent H, 37.3 percent O and 16.3 percent N. Calculate the molecular formula of the compound.

2) The Ka for benzoic acid is 6.5 x 10^-5. Calculate the pH of a 0.10 M benzoic acid solution.

3) If 20.0 mL of 0.10 M Ba(NO3)2 are added to 50.0 mL of 0.10 M Na2CO3, will BaCO3 precipitate?

4) Compare the molar solubility of Mg(OH)2 in water and in a solution buffered at a pH of 9.0.

5) Calculate the pH of the 0.20M NH3/0.20M NH4Cl buffer. What is the pH of the buffer after the addition of 10.0 mL of 0.10M HCl to 65.0 mL of the buffer?

6) Given the following absolute entropies, determine *S*o for the reaction

SO3(*g*) + H2O(*l*) H2SO4(*l*)

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| --- | --- | --- |
|   |   | *S*o (J/K mhtml:file://C:\Documents%20and%20Settings\tamatha.perkins\Desktop\Chemistry\Quiz%204%20Preview.mht!http://myedison.tesc.edu/tescdocs/Web_Courses/CHE-112-OL/Rewrite_0203/images/middot.gifmol) |
| SO3 |   | 256.2 |
| H2O |   | 69.9 |
| H2SO4 |   | 156.9 |

7) Given the following free energies of formation, calculate *G*o for the reaction

3NO2(*g*) + H2O(*l*) 2HNO3(*l*) + NO(*g*)

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| --- | --- | --- |
|   |   | mhtml:file://C:\Documents%20and%20Settings\tamatha.perkins\Desktop\Chemistry\Quiz%204%20Preview.mht!http://myedison.tesc.edu/tescdocs/Web_Courses/CHE-112-OL/Rewrite_0203/images/delta.gif*G*mhtml:file://C:\Documents%20and%20Settings\tamatha.perkins\Desktop\Chemistry\Quiz%204%20Preview.mht!http://myedison.tesc.edu/tescdocs/Web_Courses/CHE-112-OL/Rewrite_0203/images/deg-f3.gif (kJ/mol) |
| H2O(*l*) |   | –237.2 |
| HNO3(*l*) |   | –79.9 |
| NO(*g*) |   | 86.7 |
| NO2(*g*) |   | 51.8 |

8) Nitrosyl chloride (NOCl) decomposes at elevated temperatures according to the equation

2NOCL(*g*) 2NO(*g*) + Cl2(*g*)

Use the following information to calculate *KP* for this reaction at 227oC:

*H*o = 81.2 kJ
*S*o = 128 J/K

9) Given the following free energies of formation, calculate *KP* for the reaction below at 298 K.

SO2(*g*) + NO2(*g*) SO3(*g*) + NO(*g*)

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| SO2(*g*) |   | –300.4 kJ/mol |
| SO3(*g*) |   | –370.4 kJ/mol |
| NO(*g*) |   | 86.7 kJ/mol |
| NO2(*g*) |   | 51.8 kJ/mol |
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