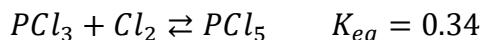


Washington University in St. Louis Chemistry Tournament
Sample Questions for Relay Round

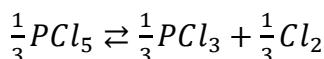
Relay Round

Group (a) will be able to solve their problem in its entirety. Group (b) will be passed a unit-less numerical answer from group (a), which is to be entered in the blank indicated by _____. This answer provided by group (a) will allow group (b) to complete solving their problem. This answer will be passed to group (c), which will enter the answer received from group (b) in the blank indicated by _____. This will allow group (c) to answer their problem. Group (c)'s answer will then be graded.

1) The answer you will receive from the previous group is indicated by _____.
a) Given that the equilibrium constant of the formation of PCl_5 in the following reaction is 0.34:

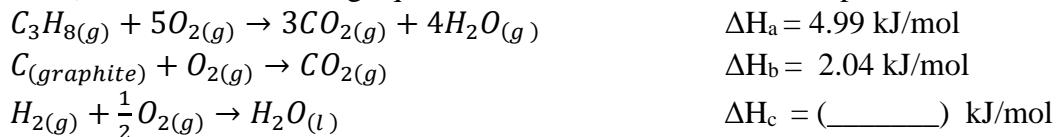


What is the equilibrium constant for the following reaction?

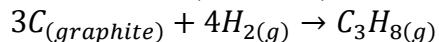


Report this answer to **three** decimal places, without any units, to the next group.

b) Given the following equations and their associated enthalpies:



Calculate ΔH (in kJ/mol) for the following reaction:

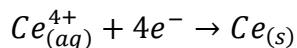


Report this answer, without units, to the next group.

c) Given the following information:



What is E° (in volts) for the following reaction:



Washington University in St. Louis Chemistry Tournament
Sample Questions for Relay Round

2) The answer you will receive from the previous group is indicated by _____

- a) A gaseous hydrocarbon (a compound that consists solely of carbon and hydrogen atoms) is found to be 88.8% C and 11.2 % H by mass. Find the empirical formula of the compound and pass it on to the next group.
- b) A compound has a density of 2.12 g/L at 31 °C and 742 torr. Given that the empirical formula is (_____), determine the molecular formula of this compound, and pass this molecular formula to the next group.
- c) Draw all possible non-cyclical structures for the compound (_____) (there are 4), and one of the two possible cyclical structures. Circle the structures that have one or more triple bonds.