## Tutorial Sheet - I

**Course:** B.Tech **Year/Semester:I/I Session:** 2020-2021

**Subject Name & Code: Engineering Chemistry (BCHS0101)**

**Max. Marks: Time allowed:**

**Q.1.** Draw the M.O. diagram of the following species. Calculate its bond order and assign magnetic character.

1. O2 b) B2 c) CO d) NO

**Q. 2.** Explain why He2+ exists and He2 does not.

**Q.3.** Arrange, NO, NO+, NO- and NO2- in increasing order of their bond length and stability.

**Q.4.** Explain why Ne2+ exists but Ne2 does not.

**Q.5.** Draw the energy level diagram of HF & HCl. Calculate its bond order and assign magnetic character.

Q.6 What is hydrogen bond? Explain different types of hydrogen bonds with suitable examples.

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## Tutorial Sheet - II

**Course: B.Tech Year/Semester:I/I Session: 2020-2021**

**Subject Name & Code: Engineering Chemistry (BCHS0101)**

**Max. Marks: Time allowed:**

**Q.1.** Calculate the weight and volume of air required for the combustion of 3kg of carbon.

**Q.2.** Calculate the volume of air required for the complete combustion of 1m3 of gaseous fuel having the composition: CO= 46%, CH4=10%, H2=4%, C2H4=2%, N2=1% and remaining being CO2.

**Q.3.** Calculate the weight and volume of air required for complete combustion of 5kg of coal with following composition: Carbon= 85%, H2= 10%, O2=4.5% and N2=0.5%.

**Q.4.**A gaseous fuel has the following composition by volume:

H2=32%, CH4=14%, N2=40% and O2=14%. If 25% excess air is used, find the weight of air actually supplied per m3 of this gas.

**Q.5. A** sampleof coal contains: C=83%, H=6% and ash=1%.

The following data were obtained when the above coal was tested in a Bomb calorimeter:

Weight of coal burnt= 0.92g, Weight of water taken= 550g

Water equivalent of calorimeter= 2200g, Rise in temperature=2.420C.

Fuse wire correction=10.0cal Acid correction=50.0cal

Calculate the NCV and GCV of fuel.

**Q.6** Calculate the LCV of fuel containing 9% hydrogen, if its GCV value is 18515cal/g.

## Tutorial Sheet - III

**Course:** B.Tech **Year/Semester:I/I Session:** 2020-2021

**Subject Name & Code: Engineering Chemistry (BCHS0101)**

**Max. Marks: Time allowed:**

**Q.1 Calculate** LCV of a fuel which has 6.5% of hydrogen and its HCV is 6300 cal/g. (Given latent heat of steam is 580 cal/g).

**Q.2** A sample of coal contain C=61%, O=32%, H=6%, S=.05%, N=0.2% and ash= 0.3%. Calculate GCV and NCV of the coal sample.

**Q.3** 2 gram of sample of coal was used for nitrogen estimation by kjeldhal method. The evolved ammonia was collected in 25ml 0.1N sulphuric acid. To neutralize excess acid 15 ml of 0.1N NaOH was required. Calculate % of nitrogen in the coal sample.

**Q.4** A sample of coal was tested in the laboratory for its calorific value in the Bomb Calorimeter. The following data were obtained: -

Wt. of coal =1.5gram, Wt of water taken =2700 gram

Water equivalent of calorimeter = 250gram, Rise in Temp. =2.48 0C,

Cooling correction=0.02 0C, Fuse wire correction = 10 cals and

Acid correction =60 cals.

Calculate the GCV and NCV of the coal in calorie per gram if coal contains 12% Hydrogen. (Latent heat of water vapour is 587 cals/gram)

**Q. 5** Calculate the weight and volume of air needed for complete combustion of 6 Kg. coal with following composition C=80%, H=10%, O=5% and N=5%. (Molar mass of air = 28.94 gm/mol)

**Q. 6** A sample of coal was analyzed as follows: - Exactly 2.0 gm was weighed into a silica crucible. After heating for one hour at 110 0C, the residue weighed 1.975 gm. The crucible next was covered with a vented lid and strongly heated for 7 minutes at 950+-200c The Residue Weighed 1.328 gm. The crucible was then heated without cover until a constant weight was obtained. The last residue was found to weigh 0.205gm. Calculate the % results of above analysis