

Technical Observation for quiz 01

We congratulate all contributors to the weekly quiz # 1. However some contributions are still too long and not focused on the subject.. We received total 28 contributions. There were two topics in this quiz, most of the people answered to topic 1 only. The answer to topic 1 in most of the cases was not to the point. The correct answer is as given below. For topic 2 only 13 participants contributed. Very few answers touched the topic.

The answer to topic 1

$$\text{NCV} = \text{GCV} - r \times \frac{9h + w}{100} \quad \text{kJ/ kg, or kCal/ kg, or MJ/ kg or kWh/ kg}$$

Where

NCV = Net calorific value

GCV = Gross calorific value as given by a bomb calorimeter test

h = Atomic Hydrogen (H) in the fuel in mass present as given by a ultimate chemical analysis of the fuel

w = water content of the fuel in mass %, as given by a proximate analysis of a fuel.

r = heat of evaporation of water at a reference temperature given by national codes in the same unit as GCV.

This r constant differs depending on which reference temperature is taken (0° ,15°, 25° C). The water coming from w is called physically bound water, since it can be evaporated and measured by an approximate analysis test.

The water coming from atomic Hydrogen (H) in the fuel is called chemically bound water since it forms during the combustion process. There is no gaseous H₂ in a fuel.

Further note, that it is best to first decide about the equation to calculate the NCV out of GCV. From this equation it becomes clear what additional fuel parameters are needed.

You may appreciate that the algorithm, the variables w, h, as well as the constant, r, need to be defined by a test code or norm. However norms differ from country to country.

We observed a few miss conceptions, and have same advise

1. There are no (H₂) hydrogen molecules in a fuel, but only atomic Hydrogen (H).Consequently a fuel composition cannot be expressed in % H₂
2. No additional information about the fuel except % weight of atomic hydrogen, and its physically bound water content is necessary.
3. A bomb calorimeter test to establish GCV is always based on laboratory conditions, i.e. the moisture content of the fuel, during the time of testing.
4. A laboratory usually calculates from GCV as tested into GCV on a bone dry basis i.e. 0% moisture. From there the client calculates back into GCV as fired using the as fired water content w of the fuel.
5. You may download a fuel calculator that demonstrates the difference between moisture free (mf), moisture and ash free (maf) and as received (ar) chemical composition as well as GCV and NCV of a fuel from our website.

The winners are

Topic 1

1. Mr. Subramaniam Balamuthu Manickam,
INTESCO Asia Limited Rs.1,000
2. Mr. Manjeet Singh Rs.1,000

Topic 2

1. Mr. R.S.Sah, Reliance Energy
Dahanu Thermal Power Station Rs.1,000
2. Mr. Subramaniam Balamuthu Manickam
INTESCO Asia Limited Rs.1,000

Congratulation to all the winners! Keep the good work.