

# Datasheet

## COMBUSTION REACTIONS FOR FUEL ELEMENTS WITH COMBINING WEIGHTS AND VOLUMES WITH HEATING VALUES

Combustible element	Chemical reaction	Volumes	Weight of combustibles (kg)						
			Oxygen (kg)	Nitrogen (kg)	Air (kg)	Gaseous products (kg)	m <sup>3</sup> oxygen/kg fuel	m <sup>3</sup> air/kg fuel	Heating value kJ kg <sup>-1</sup>
Carbon	$C + O_2 \rightarrow CO_2$	1 vol C + 1 vol O <sub>2</sub> = 1 vol CO <sub>2</sub>	1.21	4.02	5.23	5.69	31.65	9.45	3 396
Carbon	$2C + O_2 \rightarrow 2CO$	2 vol C + 1 vol O <sub>2</sub> = 2 vol CO	0.6	2.01	2.62	3.07	—	—	1 033
Carbon monoxide	$2CO + O_2 \rightarrow 2CO_2$	2 vol CO + 1 vol O <sub>2</sub> = 2 vol CO <sub>2</sub>	0.26	0.86	1.12	1.58	0.42	2.03	2 363
Hydrogen	$2H_2 + O_2 \rightarrow 2H_2O$	2 vol H <sub>2</sub> + 1 vol O <sub>2</sub> → 2 vol H <sub>2</sub> O	3.64	12.07	15.71	16.16	5.92	28.28	14 421
Methane	$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$	1 vol CH <sub>4</sub> + 2 vol O <sub>2</sub> → 1 vol CO <sub>2</sub> + 2 vol H <sub>2</sub> O	1.82	6.03	7.85	8.31	2.96	14.14	5 548
Sulphur	$S + O_2 \rightarrow SO_2$	1 vol S + 1 vol O <sub>2</sub> → 1 vol SO <sub>2</sub>	0.45	1.51	1.96	2.42	0.74	3.54	942

**MONTHLY OIL EXTRACTION RATE (OER) FOR THE YEAR 2002 IN MALAYSIA**

State	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Johore	19.19	19.31	19.86	19.74	20.02	19.80	19.57	19.38	18.99	18.36	18.31	18.08	18.53	18.60	18.23	18.13	18.19	18.39	18.79
Kedah	20.71	20.74	20.90	20.46	20.17	19.50	19.25	19.34	19.10	18.54	18.40	18.33	18.18	18.29	18.35	18.44	18.40	18.65	18.90
Kelantan	18.89	19.28	19.98	20.12	19.99	19.91	19.69	19.71	19.40	18.82	18.65	18.78	18.68	18.98	19.03	18.04	18.82	19.00	19.18
Malacca	19.72	19.71	19.67	20.02	19.98	19.85	19.82	19.57	19.30	18.81	18.62	18.24	18.49	18.82	18.33	18.09	17.87	18.48	19.28
N. Sembilan	19.40	19.05	19.66	19.88	19.87	19.65	19.45	19.40	19.14	18.80	18.71	18.41	18.97	18.80	18.35	18.00	18.08	18.25	18.73
Pahang	18.94	18.95	19.17	20.06	20.30	20.03	19.76	19.43	18.89	18.37	18.50	18.35	18.62	18.91	18.48	17.99	18.44	18.52	18.92
Perak	19.25	19.44	19.44	19.35	19.04	19.26	19.20	19.00	18.96	18.39	18.42	18.37	18.56	18.54	18.21	18.26	18.32	18.58	18.81
Penang	18.51	18.77	18.94	18.79	19.07	18.56	18.33	18.41	18.28	17.76	17.33	17.65	17.24	17.21	17.43	17.98	18.00	17.94	18.12
Selangor	18.96	19.29	19.46	19.38	19.23	19.49	19.12	18.96	18.98	18.58	18.58	18.51	18.87	18.68	18.34	18.40	18.32	18.34	18.771
Terengganu	18.31	18.93	19.30	19.75	19.84	19.87	19.91	19.48	18.77	18.39	18.42	18.30	18.55	18.93	18.77	17.85	18.35	18.62	8.88
<b>P. Malaysia</b>	<b>18.98</b>	<b>19.18</b>	<b>19.52</b>	<b>19.72</b>	<b>19.80</b>	<b>19.70</b>	<b>19.48</b>	<b>19.28</b>	<b>18.96</b>	<b>18.43</b>	<b>18.44</b>	<b>18.30</b>	<b>18.60</b>	<b>18.69</b>	<b>18.36</b>	<b>18.12</b>	<b>18.31</b>	<b>18.47</b>	<b>18.84</b>
Sabah	19.94	20.44	20.89	21.22	20.46	20.42	20.77	20.70	20.70	20.00	19.50	19.53	18.92	20.11	20.55	19.76	20.10	20.61	21.72
Sarawak	17.29	20.62	19.99	21.62	21.01	21.09	21.47	21.23	21.41	20.79	20.44	20.00	20.41	21.10	21.05	20.83	20.52	20.96	21.57
<b>Sabah/Sarawak</b>	<b>19.39</b>	<b>20.48</b>	<b>20.63</b>	<b>21.30</b>	<b>20.56</b>	<b>20.54</b>	<b>20.84</b>	<b>20.85</b>	<b>20.76</b>	<b>20.12</b>	<b>19.69</b>	<b>19.62</b>	<b>19.23</b>	<b>20.28</b>	<b>20.64</b>	<b>19.93</b>	<b>20.16</b>	<b>20.56</b>	<b>21.66</b>
<b>MALAYSIA</b>	<b>19.01</b>	<b>19.29</b>	<b>19.62</b>	<b>19.87</b>	<b>19.87</b>	<b>19.78</b>	<b>19.64</b>	<b>19.47</b>	<b>19.21</b>	<b>18.67</b>	<b>18.63</b>	<b>18.51</b>	<b>18.71</b>	<b>19.03</b>	<b>18.91</b>	<b>18.60</b>	<b>18.86</b>	<b>19.22</b>	<b>19.91</b>

Source: MPOB.

Note: The performance by Sabah had been spectacular for the year 2002, being the highest since 1984. Sarawak has also done well but not well enough to beat its 1987 record of 21.62%. P. Malaysia is lagging behind but still managed to get the highest in 10 years.