Unit 13 - Week 11

Assignment 11

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-12-02, 23:59 IST.

Common data for questions 1-4

In a SL/RN unit, following data are given:

Input hematite ore composition as: Fe_{total} = 66%, SiO_2 = 3%, Al_2O_3 = 2.5% and remaining CaO.
Reductant coal have 80% fixed carbon. Sponge iron(DRI) produced has 90% Fe_{met}. Assume combined iron present in the sponge iron as FeO and reduction product gas as CO only.

Based on the above mentioned data, solve the **questions 1, 2, 3 and 4.**

1) 2 points

Calculate the amount of ore required per ton of DRI.

a. 1314 kg
b. 1364 kg
c. 1414 kg
d. 1284 kg

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b

2) 4 points

Calculate degree of metallization.

a. 87.40 %
b. 89.40 %
c. 91.40 %
d. 93.40 %

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c

3) 2 points

Composition of DRI produced is

a. $Fe_{metallic}$ = 84.258%, FeO=7.955%, SiO_2=4.092%, Al_2O_3=3.410% and CaO=0.286%
b. $Fe_{metallic}$ = 82.258%, FeO=9.955%, SiO_2=4.092%, Al_2O_3=3.410% and CaO=0.286%
c. $Fe_{metallic}$ = 85.258%, FeO=8.955%, SiO_2=3.092%, Al_2O_3=2.410% and CaO=0.286%
d. $Fe_{metallic}$ = 82.258%, FeO=7.955%, SiO_2=5.092%, Al_2O_3=4.410% and CaO=0.286%

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b

4) 4 points

Calculate stoichiometric amount of coal required per ton of DRI for direct reduction.

a. 341 kg
b. 381 kg
c. 441 kg
d. 281 kg

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a

5) 2 points

A hematite ore contains 60% total iron. After conversion to sponge iron with 100% metallization, the grade of the sponge (% total iron in the sponge, round off to nearest integer) is_____.

a. 94-95
b. 90-91
c. 85-86
d. 80-81

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d

6) 3 points

Match the reduction units with direct reduction (DR) processes.

DR processes	Reduction units
1. SL/RN	P. Shaft Reactor
2. Hyl-III	Q. Fluidised Bed Reactor
3. FIOR	R. Rotary Hearth Furnace
4. Fastmet	S. Rortary Kiln

a. 1-Q, 2-S, 3-P, 4-R
b. 1-S, 2-R, 3-Q, 4-P
c. 1-Q, 2-P, 3-S, 4-R
d. 1-S, 2-P, 3-Q, 4-R

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d

7) 2 points

Find the correct statement(s).

a. Carbon percentage in gas-based DRI is higher than coal-based DRI
b. Sulphur content of gas based DRI is higher than coal based DRI
c. Percentage metallization of gas based DRI is higher than coal based DRI
d. Gas based DRI are more prone to re-oxidation

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a
c
d

8) 2 points

Accretion formation in rotary kiln may be controlled by:

a. Lower rotational speed of the kiln
b. High furnace temperature
c. Low ash coal
d. Higher supply of secondary air

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a
c

9) 2 points

Nugget can be produced from which variant of rotary heath furnace process?

a. INMETCO Process
b. COMET Process
c. Fastmet Process
d. ITmk3 Process

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d

10) 2 points

Which is not a coal-based direct reduction process?

a. Codir
b. TDR
c. Finmet
d. Circofer

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c

11) 2 points

Iron oxide is reduced by hydrogen gas only in _____ DR process.

a. Finmet
b. FIOR
c. Circored
d. Midrex

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c

12) 1 point

Typical energy consumption per tonne of DRI in the HYL III process is around _____.

a. 12-13 GJ/tonne DRI
b. 6-7 GJ/tonne DRI
c. 9-10 GJ/tonne DRI
d. 14-15 GJ/tonne DRI

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c

13) 1 point

Specific energy consumption per tonne of DRI in the HYL I process is approximately _____.

a. 12-13 GJ/tonne DRI
b. 6-7 GJ/tonne DRI
c. 9-10 GJ/tonne DRI
d. 14-15 GJ/tonne DRI

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d

14) 2 points

In which process gangue of reductant coal remains with DRI?

a. Fastmet
b. Circofer
c. SL/RN
d. TDR (TISCO direct reduction)

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a

15) 2 points

Identify the driving forces for evolution of coal based direct reduction (DR) processes:

a. Use of non-coking coal
b. Less pollution
c. Production on large scale
d. Supply of cold charge for steel making

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a
d