Unit 10 · Metallurgy

WORKSHEET

Full marks 50

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 50

1 Key words [4]

Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

aqua regia	bauxite	calcination	flux	gangue	ore	pig iron	roasting	slag	wrought iron

A mineral from which a metal can be extracted easily and profitably is an _____. The unwanted rock and sand mixed with it is _____. A substance added to join with the gangue is a _____, and the liquid waste it forms is _____. Heating an ore strongly with little or no air is _____. The iron that comes out of a blast furnace is _____, and the purest form of iron, with less than 0.1% carbon, is _____. A mixture of three parts concentrated hydrochloric acid and one part concentrated nitric acid is _____.

2 Multiple choice [5]

Choose the correct option for each of the following questions.

i. The flux used in the extraction of iron is: [1]

a. coke **b.** silica
c. limestone **d.** hot air

ii. The hottest part of the blast furnace is the: [1]

a. zone of combustion **b.** zone of fusion
c. zone of slag formation **d.** zone of reduction

iii. Which form of iron has the least carbon? [1]

a. pig iron **b.** cast iron
c. steel **d.** wrought iron

iv. When copper reacts with dilute nitric acid, the gas given off is: [1]

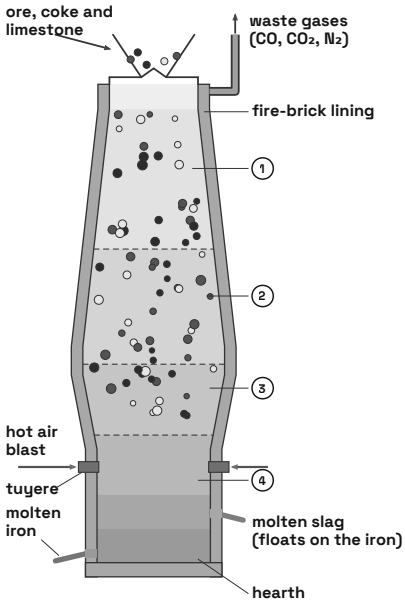
a. hydrogen **b.** nitric oxide
c. nitrogen **d.** oxygen

v. Which metal does not dissolve in aqua regia? [1]

a. gold **b.** copper
c. iron **d.** silver

3 Label the diagram [4]

The diagram shows a blast furnace cut in half. In place of 1 to 4, name each zone and give its temperature. Each carries 1 mark.



1. _____ **2.** _____

3. _____ **4.** _____

4 Very short answers [4]

Write very short answers to the following questions.

a. Write the formula of hematite. [1]

b. Which gas does most of the reducing in a blast furnace? [1]

c. Which of iron, copper, aluminium, silver and gold is the best conductor of electricity? [1]

d. How much pure gold is there in 12 g of 18-carat gold? [1]

5 Short answers [8]

Write short answers to the following questions.

a. All ores are minerals, but all minerals are not ores. Give a reason. [2]

b. Limestone is added to the charge of a blast furnace. Give a reason. [2]

c. Aluminium seems not to react with dilute hydrochloric acid at first, though it is above hydrogen in the reactivity series. Give a reason. [2]

d. Nitric acid does not give hydrogen with most metals. Give a reason. [2]

6 Long answers [12]

Write long answers to the following questions.

a. Describe the reactions that take place in the different zones of a blast furnace, with equations. [4]

b. How do copper, silver and iron react with dilute nitric acid? Write the equations. Why are brown fumes seen at the mouth of the test tube? **[4]**

c. What is aqua regia? How does it react with gold? **[4]**

7 Numerical problems **[10]**

Solve the following problems. Show your working.

a. 5.6 g of iron filings are added to excess dilute hydrochloric acid. (i) What mass of hydrogen is given off? (ii) What volume does it occupy at STP? (Fe = 56, H = 1) **[2]**

Answer:

b. Which gives more hydrogen at STP with excess dilute sulphuric acid: 2.7 g of aluminium or 5.6 g of iron? Show your working. (Al = 27, Fe = 56) **[3]**

Answer:

c. 19.05 g of copper dissolves completely in dilute nitric acid. What volume of nitric oxide is formed at STP? (Cu = 63.5) **[3]**

Answer: _____

d. A gold bangle has a mass of 23.3 g and a volume of 1.30 cm^3. Is it pure gold? (density of pure gold 19.3 g/cm^3) **[2]**

Answer: _____

8 Think **[3]**

A rock of hematite is 70% iron, and a rock of siderite only 48%. Yet a mine of siderite could give more iron per tonne of rock than a mine of hematite. How?

9 Activity: Flow sheet of the extraction of iron (not marked)

Draw the flow sheet on a chart paper. Fill in the table first.

Step	Method	Added	Removed
crushing			
concentration			
calcination			
smelting			