AP ENVIRONMENTAL SCIENCE • EXERCISE SHEET

7.1 Introduction to Air Pollution

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

Objective

Build the skills to answer exam questions on **air pollution**.

You must be able to:

- distinguish **primary** 一次 and **secondary** 二次 pollutants
- name major pollutants and their sources
- link combustion to air pollution

1 Worked examples

Study these first. Each one shows the method for a question type used later —follow the steps and you can do the Practice and Exam-style questions yourself.

Primary vs secondary pollutants

- **Primary pollutants** are emitted **directly** (e.g. CO, SO_2, NO_x, particulates from burning fuel).
- **Secondary pollutants** form **in the air** from reactions of primary ones (e.g. ozone in smog, sulfuric acid in acid rain).

Major pollutants and sources

- **CO** —incomplete combustion (cars).
- **SO_2** —burning coal (sulfur) → acid rain.
- **NO_x** —high-temperature combustion → smog, acid rain.
- **Particulate matter (PM)** —soot, dust → lung damage.

A worked classification

SO_2 from a coal plant is a **primary** pollutant; the sulfuric acid it forms in the atmosphere is a **secondary** pollutant.

The main cause

Most air pollution comes from **burning fossil fuels** in vehicles, power plants, and industry.

2 Practice

Now apply the methods above.

2.1 Distinguish a primary from a secondary pollutant. [2]

2.2 Name one pollutant from burning coal. [1]

2.3 What is the main human source of air pollution? [1]

3 Exam-style questions

3.1 A secondary pollutant is one that [1]

- **A** is emitted directly
- **B** forms in the air from other pollutants
- **C** is always harmless
- **D** comes only from volcanoes

3.2 A coal power plant emits SO_2, which later forms sulfuric acid in the atmosphere.

(a) Classify SO_2 and sulfuric acid. [2]

(b) State one environmental effect of this. [1]

3.3 Explain why reducing fossil-fuel combustion reduces most air pollution. [2]

4 Go further

You are now ready for the real exam questions on this subtopic:

- work through the **7.1 Introduction to Air Pollution** lesson on the **Learn** page;
- read the **Introduction to Air Pollution** section of the AP Environmental Science handout on the **Know** page.

Solutions

2.1 Primary pollutants are emitted directly; secondary pollutants form in the air from primary ones.

2.2 SO_2 (or particulates).

2.3 Burning fossil fuels.

3.1 B —forms in the air from other pollutants.

3.2 (a) SO_2 = primary; sulfuric acid = secondary. (b) Acid rain.

3.3 Most primary and secondary pollutants come from burning fossil fuels, so cutting combustion cuts emissions of CO, SO_2, NO_x, and particulates at the source.