

15.6 Compton Scattering

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS **compton scattering** 康普顿散射 • **momentum** 动量

Objective

Build the skills to answer exam questions on **Compton scattering**.

You must be able to:

- describe **Compton scattering** 康普顿散射 as a photon colliding with an electron
- explain that the scattered photon has a longer wavelength (lower energy)
- state that Compton scattering conserves both energy and **momentum** 动量

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ Compton scattering

A photon collides with an electron much like two particles — clear evidence of the **particle** nature of light.

■ Wavelength shift

The photon gives some energy to the electron, so the **scattered photon has less energy** and therefore a **longer wavelength**.

■ Conservation

Both **energy** and **momentum** are conserved in the collision.

2 Practice

2.1 State what Compton scattering involves. [1]

2.2 State what happens to the photon's wavelength after scattering. [1]

2.3 State the two quantities conserved in Compton scattering. [2]

3 Exam-style questions

3.1 In Compton scattering, the scattered photon has a [1]

A	B
C	D

A shorter wavelength

B longer wavelength

C higher frequency

D unchanged energy

3.2 Compton scattering treats light as a [1]

A	B
C	D

A wave

B particle

C field

D fluid

3.3 A photon scatters off a stationary electron.

(a) State what happens to the photon's energy. [1]

(b) Explain your answer using conservation of energy. [2]