

## DISCOVERY OF THE ELECTRON

Thomson's most important line of work, interrupted only for lectures at [Princeton University](#) in 1896, was that which led him, in 1897, to the inference that all [matter](#), whatever its source, contains particles of the same kind that are much less massive than the atoms of which they form a part. They are now called [electrons](#), although he originally called them corpuscles.

His discovery was the result of an attempt to solve a long-standing controversy regarding the nature of [cathode rays](#), which occur when an [electric current](#) is driven through a vessel from which most of the air or other gas has been pumped out.

Nearly all German physicists of the time held that these visible rays were produced by occurrence in the ether – a weightless substance then thought to pervade all space – but that they were neither ordinary light nor the recently discovered [X rays](#). British and French physicists, on the other hand, believed that these rays were electrified particles.

By applying an improved vacuum technique, Thomson was able to put forward a convincing argument that these rays were composed of particles. Furthermore, these rays seemed to be composed of the same particles, or corpuscles, regardless of what kind of gas carried the electric discharge or what kinds of metals were used as conductors. Thomson's conclusion that the corpuscles were present in all kinds of matter was strengthened during the next three years, when he found that corpuscles with the same properties could be produced in other ways – *e.g.*, from hot metals. Thomson may be described as “the man who split the atom” for the first time, although “chipped” might be a better word, in view of the size and number of electrons. Although some atoms contain many electrons their total mass is never so much as 1/1000 that of the atom.

By the turn of the century most of the scientific world had fully accepted Thomson's far-reaching discovery. In 1903 he had the opportunity to amplify his views on the behaviour of subatomic particles in natural phenomena when, in his Silliman Lectures at Yale, he suggested a discontinuous theory of light; his hypothesis foreshadowed Einstein's later theory of photons. In 1906 he received the Nobel Prize for Physics for his researches into the [electrical conductivity](#) of gases; in 1908 he was knighted; in 1909 he was made president of the British Association for the Advancement of Science; and in 1912 he received the Order of Merit.

1. Thompson's conclusion was that all matter ...
  - a) had to be considered.
  - b) is necessary for lectures.
  - c) consists of tiny particles.
  - d) has the same properties.
- 2 His discovery was ...
  - a) the consequence of his work.

- b) a bad shot to solve the controversy.
  - c) false.
  - d) held with the help of his colleagues.
- 3 Nearly all scientists of that time ...
- a) thought that rays were produced in the ether.
  - b) agreed with Thompson.
  - c) helped Thompson in his work.
  - d) could produce rays in the ether.
- 4 Thomson managed to ...
- a) give lectures and work simultaneously.
  - b) write some scientific books
  - c) prove that rays were made of particles.
  - d) give the explanation of an improved vacuum technique.
- 5 By the turn of the century most of the scientific world ...
- a) approved Thomson's discovery.
  - b) ignored Thomson's discovery.
  - c) rejected Thomson's discovery.
  - d) laughed at Thomson's discovery.

*For statements (6-10) choose "True" if the statement is true according to the text, "False" if the statement is false:*

- 6. Thomson called particles electrons.
- 7. British and French physicists considered visible rays to be electrically neutral particles.
- 8. X-rays were made up of the same particles.
- 9. Types of conductors didn't influence the composition of the particles.
- 10. Thomson became the winner of the most significant prize in science for the discovery of the electron.

**Use of English. Chose the word with appropriate meaning**

Mechanics is generally taken (11) \_\_\_\_\_ the study of the motion of objects under the action of given forces. In [classical mechanics](#) the laws are initially formulated for the point particles in which the dimensions, shapes, and other (12)\_\_\_\_\_ properties of bodies are ignored. Thus in the first approximation even (13) \_\_\_\_\_ as large as the [Earth](#) and the [Sun](#) are treated as point like.

In rigid-body dynamics, the extension of bodies and their mass distributions are considered as well, but they are (14) \_\_\_\_\_ to be incapable of [deformation](#).

The mechanics of deformable (15) \_\_\_\_\_ is [elasticity](#); [hydrostatics](#) and [hydrodynamics](#) treat, respectively, fluids at rest and in motion.

The three [laws of motion](#) (16) \_\_\_\_\_ by [Isaac Newton](#) form the foundation of classical mechanics, together with the recognition that forces are [vector](#) quantities. The first law (17) \_\_\_\_\_ that, unless acted upon by an external [force](#), an object at rest remains at rest, or if in motion, it continues to move in a straight line with constant speed. Uniform motion therefore does not require a cause. Accordingly, mechanics concentrates not on motion as such but on the change in the state of motion of an object that results from the (18) \_\_\_\_\_ [force](#) acting upon it.

[Newton's second law](#) equates the net force on an object to the (19) \_\_\_\_\_ of change of its momentum, the latter being the product of the mass of a body and its velocity. [Newton's third law](#) states that when two particles interact, the forces each (20) \_\_\_\_\_ on the other are equal in magnitude and opposite in direction.

11. to mean  
to respond  
to react  
to attract

12. interactive  
intrinsic  
equal  
incapable

13. places  
substitutions  
objects  
particles

14. pressed  
continued  
ignored  
imagined

15. solids  
liquids  
gases

fluids

16. set forth  
continued  
accelerated  
decelerated

17 states  
anticipates  
acts  
provokes

18. clean  
clear  
prospective  
net

19. rate  
increase  
decrease  
simultaneity

20. exerts  
prevails  
produces  
rejects

21. The sausages \_\_\_\_\_ delicious.  
taste  
tastes  
are tasting  
will have been tasting

22. You haven't said a word all morning. What \_\_\_\_\_ about?  
do you think  
will you think  
are you thinking  
think

23. Mary \_\_\_\_\_ very naughty these days. What's the matter with her?  
is  
will be  
is being  
have been

24. Where is Steve? – He \_\_\_\_\_ to Berlin on business. He is going to return in two days.  
has been  
has gone  
was  
goes

25. People living next to me are my real problem. They \_\_\_\_\_. I'm fed up with it!  
are always arguing  
always argue  
have argued  
have been arguing

26. After I \_\_\_\_\_ digging, I decided to watch a film  
have finished]  
finished  
will finish  
had finished

27. He was exhausted. He \_\_\_\_\_ for hours!  
has been working  
had been working  
has worked  
is working

28. I \_\_\_\_\_ in a small house when I was a small girl. Now I live in a flat  
used to live  
lived  
have been living  
had been living

28. I will have finished it \_\_\_\_\_ 7 o'clock  
by  
on  
in  
for

29. When she \_\_\_\_\_, she will give you your money  
arrives  
arrived  
had arrived  
is arriving

30. By 7 o'clock they \_\_\_\_\_ cricket for eight hours!  
are playing  
will be playing  
will have been playing  
have played

31. Paul pretended \_\_\_\_\_ a lot of money, but in fact he had won nothing at all  
to have won  
win  
winning  
having won

32. You should \_\_\_\_\_ now instead of watching TV  
be studying  
to be studying  
having studied  
have studied

33. The house looks so clean! They must \_\_\_\_\_ all day!  
clean  
be cleaning  
have been cleaning  
to clean

34. \_\_\_\_\_ vegetables is good for your health.  
Eating  
Having eaten  
Being eaten  
To be eaten

35. I can't help \_\_\_\_\_ her kindness  
to admire  
admiring  
admire  
being admired

36. I remember \_\_\_\_\_ last year!  
being  
to be  
having been  
be

37. I think you'd better \_\_\_\_\_ home  
going  
having gone  
go  
to go

38. He ran all the way without \_\_\_\_\_  
having stopped  
stopping  
to stop  
to be stopped

39. The teacher doesn't allow \_\_\_\_\_ in the class  
to talk  
talking  
talk  
be talked

40. These windows are dirty. They need \_\_\_\_\_.  
washing  
to be washed  
wash  
to wash