

The early periodic table

Mark scheme

1. Mendeleev's table 2
 contains only elements
 divides metals and non-metals
 contains far more elements which were discovered later
 groups elements according to chemical properties
 puts elements in order of atomic number / atomic mass / table includes these numbers
 can use to work out / linked to electronic structures
 left gaps for missing elements which had not been discovered
other sensible answers
any two for 1 mark each [2]
2. (a) comment + relevant example gets **1 + 1** marks max 3
 third marking point can be **either** a comment **or** an example unrelated
 to first comment i.e. 3 comments would be max **2** marks
 (could be many answers)
ignore references to music
 e.g. many elements in the groups have very dissimilar properties e.g. Cu + K
 (= 2 marks)
 two elements in one place on the table e.g. Ce or La (= 2 marks)
 no clear division between metals and non-metals **or** metals and non-metals
 jumbled / mixed up (could give example from table)
 Newlands didn't allow spaces for new elements
- (b) any **two** from: 2
 elements with dissimilar properties are separated
or grouped elements with similar properties
 gaps left for elements to be added when discovered
 relative atomic mass order not followed in all cases (so that elements go in groups
 with other similar elements) **or** Mendeleev in proton number order
 groups related to electronic structure
or group number equals number of outer electrons
 new groups created **or** iron, cobalt nickel in a group
or eight groups instead of seven
 correct elements in periods 2 and 3
 reactivity trends in groups **or** reactivity trends across periods
 separates metals and non-metals [5]

C3.1.1 Mark Scheme

3. (i) any **two** sensible ideas such as: 2
- (why) put in order of mass
accept other equally valid orders, eg alphabetical
 - he left gaps **or** table not complete
 - no evidence for undiscovered elements
or they believed all the elements had been discovered
accept predictions could not be backed by evidence
accept why change previous ideas
 - he changed the order of some elements
or there were exceptions to the rule(s)
 - he put metals and non-metals together
accept they didn't like his groupings / groups
 - he did not explain his ideas clearly (owtte)
*do **not** accept modern explanations, eg proton number etc*
- (ii) (the properties of gallium) fitted the predictions (owtte) 1
or predictions were correct **or** (properties) would make it fit in the gap
or (properties) would make it fit in group 3
*do **not** accept gallium fitted his theory*
accept finding gallium proved there were new elements to be discovered

[3]