

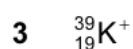
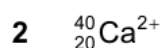
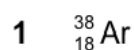
**SMART EXAM RESOURCES**  
**9701 AS CHEMISTRY TOPIC QUESTIONS**  
**TOPIC: ATOMIC STRUCTURE**  
**SUB-TOPIC: CALCULATE SUB-ATOMIC PARTICLES**  
**SET-3**

**1.1.3-Calculation-of-sub-atomic-particles-set-3**

1.

X is a particle with 18 electrons and 20 neutrons.

What could be the symbol of X?



The responses **A** to **D** should be selected on the basis of

| A                      | B                        | C                        | D                 |
|------------------------|--------------------------|--------------------------|-------------------|
| 1, 2 and 3 are correct | 1 and 2 only are correct | 2 and 3 only are correct | 1 only is correct |

No other combination of statements is used as a correct response.

2. The  ${}^1\text{H}_3^+$  ion was first characterised by J. J. Thomson over a century ago.  ${}^6\text{Li}$  is a rare isotope of lithium which forms the  ${}^6\text{Li}^+$  ion.

Which statements are correct?

- 1 Both ions contain the same number of protons.
- 2 Both ions contain the same number of electrons.
- 3 Both ions contain the same number of neutrons.

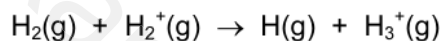
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|------------------------|--------------------------|--------------------------|-------------------|
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No other combination of statements is used as a correct response.

3. *Use of the Data Booklet is relevant to this question.*

The most common ion-molecule reaction in gas clouds of the Universe is as shown.



What could be the composition of an  $\text{H}_3^+$  ion?

|          | protons | neutrons | electrons |
|----------|---------|----------|-----------|
| <b>A</b> | 2       | 1        | 1         |
| <b>B</b> | 2       | 1        | 2         |
| <b>C</b> | 3       | 0        | 1         |
| <b>D</b> | 3       | 0        | 2         |

4.

In 2011 an international group of scientists agreed to add two new elements to the Periodic Table. Both elements had been made artificially and were called ununquadium (Uuq) and ununhexium (Uuh).

|                | Uuq | Uuh |
|----------------|-----|-----|
| proton number  | 114 | 116 |
| nucleon number | 289 | 292 |

Which statements about these elements are correct?

- 1 One atom of Uuh has one more neutron than one atom of Uuq.
- 2 One  $\text{Uuq}^{2-}$  ion has the same number of electrons as one atom of Uuh.
- 3 One  $\text{Uuh}^+$  ion has the same number of electrons as one  $\text{Uuq}^-$  ion.

The responses **A** to **D** should be selected on the basis of

| A                      | B                        | C                        | D                 |
|------------------------|--------------------------|--------------------------|-------------------|
| 1, 2 and 3 are correct | 1 and 2 only are correct | 2 and 3 only are correct | 1 only is correct |

No other combination of statements is used as a correct response.

- A) A
- B) B
- C) C
- D) D

5.

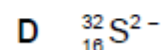
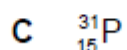
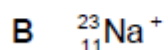
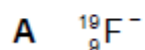
*Use of the Data Booklet is relevant to this question.*

In which option do all three particles have the same electronic configuration and the same number of neutrons?

- A  $^{15}\text{N}^{3-}$   $^{16}\text{O}^{2-}$   $^{19}\text{F}^-$
- B  $^{18}\text{O}^{2-}$   $^{19}\text{F}^-$   $^{20}\text{Ne}$
- C  $^{19}\text{F}^-$   $^{20}\text{Ne}$   $^{23}\text{Na}^+$
- D  $^{22}\text{Ne}$   $^{23}\text{Na}$   $^{24}\text{Mg}^{2+}$

6.

In which species are the numbers of protons, neutrons and electrons **all** different?



7.

The ion  $\text{Y}^{3-}$  contains 18 electrons and has a mass number of 31.

How many protons and neutrons does  $\text{Y}^{3-}$  contain?

|          | protons | neutrons |
|----------|---------|----------|
| <b>A</b> | 15      | 16       |
| <b>B</b> | 15      | 18       |
| <b>C</b> | 18      | 13       |
| <b>D</b> | 21      | 10       |

8.

*Use of the Data Booklet is relevant to this question.*

The isotope  ${}^{99}\text{Tc}$  is radioactive and has been found in lobsters and seaweed adjacent to nuclear fuel reprocessing plants.

Which statements are correct about an atom of  ${}^{99}\text{Tc}$ ?

- 1** It has 13 more neutrons than protons.
- 2** It has 43 protons.
- 3** It has 99 nucleons.

The responses **A** to **D** should be selected on the basis of

| <b>A</b>                            | <b>B</b>                              | <b>C</b>                              | <b>D</b>                       |
|-------------------------------------|---------------------------------------|---------------------------------------|--------------------------------|
| <b>1, 2 and 3</b><br>are<br>correct | <b>1 and 2</b><br>only are<br>correct | <b>2 and 3</b><br>only are<br>correct | <b>1 only</b><br>is<br>correct |

No other combination of statements is used as a correct response.

- A) A
- B) B
- C) C
- D) D

9.

In which pairs do both species have the same number of electrons?

1  $^{35}\text{Cl}$  and  $^{37}\text{Cl}$

2  $^{35}\text{Cl}^-$  and  $^{40}\text{Ar}$

3  $^{40}\text{Ar}$  and  $^{40}\text{K}^+$

The responses **A** to **D** should be selected on the basis of

| A                      | B                        | C                        | D                 |
|------------------------|--------------------------|--------------------------|-------------------|
| 1, 2 and 3 are correct | 1 and 2 only are correct | 2 and 3 only are correct | 1 only is correct |

No other combination of statements is used as a correct response.

A) A

B) B

C) C

D) D

10.

Which statements about the atoms  $^{23}\text{Na}$  and  $^{24}\text{Mg}$  are correct?

1 They have the same number of filled electron orbitals.

2 They have the same number of neutrons.

3 They are both reducing agents.

The responses **A** to **D** should be selected on the basis of

| A                      | B                        | C                        | D                 |
|------------------------|--------------------------|--------------------------|-------------------|
| 1, 2 and 3 are correct | 1 and 2 only are correct | 2 and 3 only are correct | 1 only is correct |

No other combination of statements is used as a correct response.

A) A

B) B

C) C

D) D