CRASH COURSE

CBSE 10th 2021-22

PHYSICS

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(SUBJECTIVE QUESTIONS)

(Q. 1 One Marks)

1. Why are coils of electric toasters and electric irons made of an alloy rather than a pure metal?

    OR

    Should the heating element of an electric iron be made of iron, Silver or nichrome wire? Justify giving three reasons.

2. How much energy is given to each coulomb of charge passing through a 6V battery?

3. What is an ammeter ? How is it connected in a circuit ? Draw a diagram to illustrate your answer. Also state why should the resistance of
    (a) an ammeter be very small?
    (b) a voltmeter be very large?

4. What are the factors affecting the resistance of a conductor?

5. Two resistors, with resistances 5Ω and 10Ω respectively are to be connected to a battery of emf 6V so as to obtain :
   (i)   minimum current flowing
   (ii)   maximum current flowing
   (a) How will you connect the resistances in each case ?
   (b) Calculate the strength of the total current in the circuit in the two cases.

Answer & Solutions

1.
Coils of electric toasters and electric irons made of an alloy rather than a pure metal because the resistivity of an alloy is higher than the pure metal. Also at high temperatures, the alloys do not melt easily.

2.
The energy is given to each coulomb of charge passing through a 6 v battery is 6 J. The energy is given to each coulomb of charge is equal to the amount of work required to move it. Hence, The energy is given to each coulomb of charge passing through a 6 v battery is 6 J

3.
An Ammeter is an instrument used to measure current. It should be connected in series with the circuit because current does not change at all in the circuit unless the circuit is in parallel

4.
As the temperature increases, the value of resistivity increases so resistance increases . (In the case of conductors or simply metals). Length :- Resistance is directly proportional to the length

5.
Two resistors with resistances $R1 = 5\Omega$ and $R2 = 10\Omega$, $V = 6$volt
(a) For minumu current these two should be connected in series. For maximum current these two should be connected in parallel
(b) In series,
Total resistance $= 5 + 10 = 15\Omega$
therefore total current dawn $= V/R = = 6/15 = 0.4\Omega$
In parallel,
Total resistance R is given as $1/R = R_1 + 1R/R_2$
$1/R = 1/5 + 1/10$
$1/R = 3/10$
$R = 10/3\Omega$
therefore total current drawn by the circuit $= V/R = 6/(10/3) = 1.8\Omega$
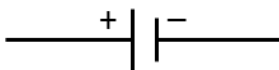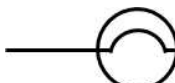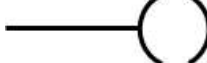
(OBJECTIVE QUESTIONS)

1. The heat produced when 144000 Coulombs of charge is transferred in 2 hours through a potential difference 50 volt is

   (a) 4788 kJ

   (b) 7200 kJ

   (c) 30000 kJ

   (d) 5748.6 kJ

2. In the given pairs of materials which are conductors :
   (a) Ebonite – Mica
   (b) Porcelain – Bakelite
   (c) Constantan – Manganin
   (d) Paper – Glass

3. In the given circuit symbols which is NOT correct

   (a) ——⊣⊢—— Cell

   (b) Electric Lamp

   (c) Rheostat

   (d) Open Plug Key

4. An electric heater draws 5 A current from 250 V supply. the same heater now connected 100 V supply. Then current the heater will draw is

   (a) 1.7 A

   (b) 2 A

   (c) 0.3 A

   (d) 2.5 A

5. Given below are four (4) statements, find the INCORRECT statement
   (a) Resistance of all pure metals has no effect of change in temperature
   (b) Resistance of a wire is proportional to the length of wire
   (c) A long wire has more resistance
   (d) Resistance of a conductor is inversely proportional to its area of cross section

Answer & Solutions

1. (b)
$H = I^2 RT$

$I = \dfrac{Q}{t} = \dfrac{144000}{60 \times 60 \times 2} = 20$ Amp

$R = \dfrac{V}{I} = \dfrac{50}{20} = 2.5\Omega$

$H = 20 \times 20 \times 2.5 \times 60 \times 60 \times 2$

$= 7200000$ J

$= 7200$ kJ

2. (c)
They are metal alloys. Alloys are not good as metals.

3. (c)

4. (b)
$V = IR \Rightarrow R = \dfrac{V}{I} = \dfrac{250}{5} = 50\Omega$

Again $I = \dfrac{V}{R} \Rightarrow \dfrac{100}{50} = 2A$

5. (a)

CHEMISTRY

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(SUBJECTIVE QUESTIONS)

(Q 1 to 4 Four Marks)

1. Write the balanced chemical equations for the following reactions.
    (a) Calcium hydroxide + Carbon dioxide → Calcium carbonate + Water
    (b) Zinc + Silver nitrate → Zinc nitrate + Silver
    (c) Aluminium + Copper chloride → Aluminium chloride + Copper
    (d) Barium chloride + Potassium sulphate → Barium sulphate + Potassium chloride

2.
    (a) What is a redox reaction ? Explain with an example.
    (b) When a magnesium ribbon burns in air with a dazzling flame and forms a white ash, is magnesium oxidised or reduced ? Why ?
    (c) Define displacement reaction with example.

3.
    (a) Define a combination reaction.
    (b) Give one example of a combination reaction which is also exothermic.
    (c) Give one example of a combination reaction which is also endothermic.

4.
    (a) Explain the term "corrosion" with an example. Write a chemical equation to show the process of corrosion of iron.
    (b) What special name is given to the corrosion of iron ?
    (c) What type of chemical reaction is involved in the corrosion of iron ?
    (d) Name any three objects (or structure) which are gradually damaged by the corrosion of iron and steel.

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(Q 5 Five Marks)

5.

    (a) What are amphoteric oxides ? Give two examples of amphoteric oxides.

    (b) Name two metals which will displace hydrogen from dilute acids, and two metals which will not.

    (c) State two ways to prevent the rusting of iron.

    (d) What type of oxides are formed when non-metals combine with oxygen ?

    (e) Differentiate between metal and non-metal on the basis of their chemical properties.

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Answer & Solutions

1.
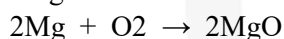
(a) The question given to us is Calcium hydroxide + Carbon dioxide → Calcium carbonate + Water. The balanced chemical reaction is $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

(b) Zinc and lead (IV) nitrate react to produce zinc nitrate and lead. What is the chemical equation for zinc combining with silver nitrate and water?

(c) When you put aluminum in copper chloride, the copper together the chloride eats away at the aluminum. There is noticeable burning smell and some faint smoke as a result of the chemical reaction. As the copper chlorides works away at the aluminum, the aluminum turning into a dark brown color

(d) $BaCl2 + K2So4 \rightarrow BaSo4 + 2KCl$

2.

(a) Redox is for describing all chemical reaction in which the oxidation number of atoms change. For example when carbon monoxide is passed over heated ferric oxide, carbon monoxide gains oxygen to form carbon dioxide

(b) Redox reaction is a chemical reaction which involves both oxidation and reduction processes.
It is also called Oxidation-Reduction reaction
Magnesium ribbon burns in air with white dazzling flame giving white ash
$2Mg + O2 \rightarrow 2MgO$
Here, Magnesium is oxidised to magnesium oxide beaxuse oxygen and magnesium combines (chemical reaction takes place) to form a compound of magnesium oxide (white powder).

(c) Displacement reaction is a chemical reaction in which a more reactive element displaces a less reactive element from its compound. Both metals and non-metals take part in displacement reactions. Example : Reaction of iron nails with copper sulphate
$Fe + CuSO4 = FeSO4 + Cu$

3.

(a) A combination reaction (also known as a synthesis reaction) is a reaction where two or more elements or compounds (reactants) combine to form a single compound (product). Such reactions may be represented by equations of the following form: $X + Y \rightarrow XY$.

(b) In a combination reaction two compounds react to form a new substance. In almost all cases, combination reaction is also an exothermic reaction.
Some combination reaction can be the combustion reaction or many more.

(c) $2NH_3(g) + energy \Leftrightarrow N_2(g) + 3H_2(g)$

4.

(a) when a metal is attacked by air or moisture that metal is said to have corroded and this whole process is tempted as Corrosion. Eg-Green colour coating on copper

(b) Rusting

(c) Redxo reaction

(d) Silver, iron and Copper

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5.

(a) Oxides of metals which have both acidic as well as basic behaviour are known as amphoteric oxides. Such metallic oxides react with acids as well as base to produce salt and water. Examples of Amphoteric oxides are aluminium oxide and zinc oxide.

(b) Iron and aluminium will displace hydrogen from dilute acids as they more reactive then hydrogen. Mercury and copper cannot displace hydrogen from dilute acids as they are less reactive than hydrogen.

(c) Oiling greasing or painting: By applying oil, grease, or paint the surface becomes water proof and them moisture and oxygen present in the air cannot come into direct contact with iron Hence, rusting is prevented

Galvanisation: An iron article is coated with a layer of zinc metal, which prevents the iron to come in contact with oxygen and moisture hence rusting is prevented

(d) When non-metals are combined with oxygen then neutral or acidic oxides are formed. Examples of acidic oxides are NO_2, SO_2 and examples of neutral oxides are NO, CO etc.

(e) Differences between metals and non-metals on the basis of their chemical properties. ... Oxides of non-metals are acidic in nature. 2. Metals displace hydrogen from dilute acids.

(OBJECTIVE QUESTIONS)

1. Which of the following does not involve a chemical reaction?
   (a) digestion of food in our body
   (b) process of respiration
   (c) burning of candle wax when heated
   (d) melting of candle wax on heating

2. You are given the solution of lead nitrate. In order to obtain a yellow precipitate you should mix with it a solution?
   (a) potassium chloride
   (b) potassium nitride
   (c) potassium sulphide
   (d) potassium iodide

3. The chemical reaction between quicklime and water is characterised by :
   (a) evolution of hydrogen gas
   (b) formation of slaked lime precipitate
   (c) change in temperature of mixture
   (d) change in colour of the product

4. One of the following is an exothermic reaction. This is :
   (a) electrolysis of water
   (b) conversion of limestone into quicklime
   (c) process of respiration
   (d) process of photosynthesis

5. You are given the following chemical equation :

   $$Mg\ (s)\ +\ CuO\ (s)\ \longrightarrow\ MgO\ (s)\ +\ Cu\ (s)$$

   This equation represents :
   (a) decomposition reaction as well as displacement reaction
   (b) combination reaction as well as double displacement reaction
   (c) redox reaction as well as displacement reaction
   (d) double displacement reaction as well as redox reaction

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Answer & Solutions
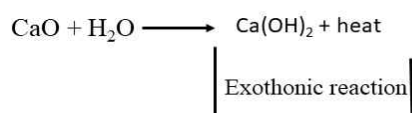
1. (d)

   In all the other processes, a new compound is formed and the process is irreversible, but not in the case of melting of candle wax.

2. (d)

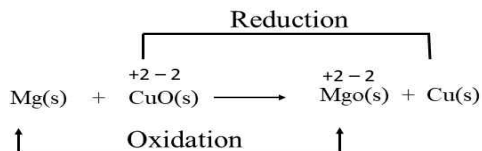 $$Pb(NO_3)_2 + KI \longrightarrow \underbrace{PbI_2}_{yellow\ precipitate} + KNo_3$$

3. (c)

   $$CaO + H_2O \longrightarrow \underbrace{Ca(OH)_2 + heat}_{Exothonic\ reaction}$$
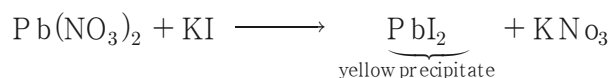
   Liberation of heat is the characteristic of this reaction.

4. (c)

   Process of respiration is accompained by release of heat energy.

5. (c)

   $$\overset{\text{Reduction}}{\overbrace{Mg(s) + \overset{+2\ -2}{CuO(s)} \longrightarrow \overset{+2\ -2}{MgO(s)} + Cu(s)}}_{\text{Oxidation}}$$

   It is a Redox reaction
   Also, Cu is getting displaced from Mg.
   $\therefore$ it is a displacement reaction also.

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MATHEMATICS

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1. Use Euclid's division lemma to show that the cube of any positive integer is of the form $9m$, $9m + 1$ or $9m + 8$.

2. Find the LCM and HCF of the following pairs of integers and verify that LCM × HCF = product of the two number.

   (a) 6, 72 and 120

3. Prove that $3 + 2\sqrt{5}$ is irrational.

4. The graphs of $y = p(x)$ are given in Fig. below, for some polynomials $p(x)$. Find the number of zeroes of $p(x)$, in each case.

   (i)

   (ii)
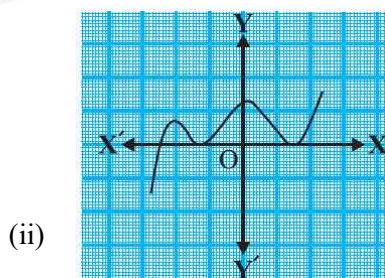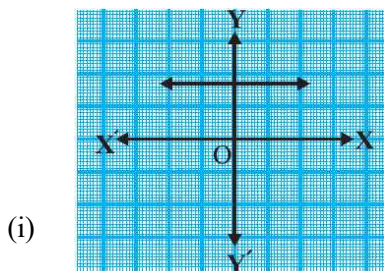
5. Find the zeroes of the quadratic polynomial and verify the relationship between the zeroes and the coefficients.
   $3x^2 - x - 4$

Answer & Solutions

1.
Let x be any positive integer. Then it is of the form 3q or 3q + 2.
So, we have the following cases :
Case I : When x = 3q.
then, $x^3 = (3q)^3 = 27q^3 = 9(3q^3) = 9m$, where $m = 3q^3$.
Case II : When x = 3q + 1
then, $x^3 = (3q + 1)^3$
$= 27q^3 + 27q^2 + 9q + 1$
$= 9q(3q^2 + 3q + 1) + 1$
Case III. When x = 3q + 2
then, $x^3 = (3q + 2)^3$
$= 27q^3 + 54q^2 + 36q + 8$
$= 9q(3q^2 + 6q + 4) + 8$
$= 9m + 8$, where $m = q(3q^2 + 6q + 4)$
Hence, x3 is either of the form 9 m or 9 m + 1 or, 9 m + 8.

2.
26   =   2 x 13
91   =   7 x 13
HCF   =   13
LCM   =   2 x 7 x 13   =182
Product of two value   26 x 91   = 2366
Product of HCF and LCM   13 x 182   = 2366
Hence, product of two numbers = product of HCF × LCM

3.
Let as assume to the contrary that $1\sqrt{3}$ is rational number
$1\sqrt{3}$ = P/Q{where p and Q are co-prime and Q not equal to 0}
$\sqrt{3}$ = P = Q.1
$\sqrt{3}$ = Q/P
$\sqrt{3}$ = Irrational number
Q/P = Rational
Irrational not rqual to rational
This is contraction has arise by the wrong assumption because of our incorrect assumption that
$1\sqrt{3}$ is rational.
hence, $1/\sqrt{3}$ irrational {proved}

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4.

It has no zeros as it doesn't intersect the x-axis

It has 1 zero as it intersects the x-axis once.

It has 3 zeros as it intersects the x-axis thrice.

It has 2 zeros as it intersects the x-axis twice.

It has 4 zeros as it intersects the x-axis 4 times

It has 3 zeros as it intersects the x-axis once and touches it twice

5.

$P(x) = 3x^2 - x - 4$

Here, a = 3, b = – 1 and c = – 4

Now,

Sum of zeroes = – b / a

$\qquad\qquad$ = – (–1)/ 3

$\qquad\qquad$ = 1/3

Product of zeroes = c/a

$\qquad\qquad$ = –7/3

Now,

As not other data is given, we will find zeroes by middle term splitting

So,

$3x^2 - x - 4$

$3x^2 + 3x - 4x - 4$

3x (x + 1) – 4(x + 1)

(3x – 4) (x + 1)

3x – 4 =

3x = 4

x = 4/3

and

x + 1 = 0

x = –1

So,

The zeroes are 4/3 and –1

Now

Sum of zeroes = 4/3 + (–1)

$\qquad\qquad$ = 4/3 –1

$\qquad\qquad$ = 4 – 3/3

$\qquad\qquad$ = 1/3

Product of zeroes = 4/3 × –1

$\qquad\qquad$ = –4/3

(OBJECTIVE QUESTIONS)

1. The decimal expansion of number $\dfrac{441}{2^2 \times 5^3 \times 7}$ has
   (a) a terminating decimal
   (b) non-terminating but repeating
   (c) non-terminating non-repeating
   (d) terminating after two decimal places

2. n^2-1 is divisible by 8, if n is
   (a) an integer
   (b) a natural number
   (c) an odd integer
   (d) an even integer

3. The HCF of 95 and 152 is

   (a) 57
   (b) 1
   (c) 19
   (d) 38

4. If two positive integers a and b are written as $a = x^3 y^2$ and $b = xy^3$; x,y are prime numbers, then HCF $= (a,b)$ is _____.
   (a) xy
   (b) xy^2
   (c) $x^3 y^3$
   (d) $x^2 y^2$

5. The decimal expansion of the rational number $\dfrac{33}{2^2 \times 5}$ will terminate after

   (a) one decimal place
   (b) two decimal places
   (c) three decimal places
   (d) more than 3 decimal places

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Answer & Solutions

1. (a)

$\dfrac{441}{2^3 \times 5^3 \times 7} \quad \dfrac{63}{}$ (on simplification)

$= \dfrac{63}{2^3 \times 5^3}$

Since the denominator only contains the power of 2 and 5

$\therefore \quad \dfrac{441}{2^3 \times 5^3 \times 7}$, on simplification gives a terminating decimal expansion

2. (c)

Let $a = n^2 - 1$

Here n can be even or add

case1:- n = even ie n = 2k where r is only integer

$\qquad a = (2k)^2 - 1$

$\qquad a = 4k^2 - 1$

when R = −1, $4(-1)^2 - 1 = 3$, not divisible by 8.

when R = 0, $4(0)^2 - 1 = -1$, not divisible by 8.

case2:- n = odd, n = 2k + 1, where R is any integer

$\qquad a = (2R + 1)^2 - 1$

$\qquad a = 4k^2 + 1 + 4k - 2 \qquad$ [using $(a + b)^2$]

$\qquad a = 4k^2 + 4k$

When R = −1; $a = 3(-1)^2 + 4(-1)$

$\qquad\qquad\qquad = 4 - 4 = O$ which is divisible by 8

When, R = O; $a = 4(0)^2 + 4(0) = O$ which is divisible by 8.

When, R = 1; $a = 4(1)^2 + 4(1) = 8$ which is divisible by 8.

$\Rightarrow$ n is an odd numbers.

3. (c)

HCF (95,152)

By using Euclid's division lemma

$\quad a = bq + r$; $0 \le r \le b$

where a = dividend; b = divisor ; q = quotient ; r = semainde

$\qquad 152 = 95 \times 1 + 57$

$\qquad 95 = 57 \times 1 + 38$

$\qquad 57 = 38 \times 1 + 19$

$\qquad 38 = 19 \times 2 + 0$

$\boxed{\text{HCF } (152,95) = 19}$

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4. (b)

$a = x^3 y^2$; $b = xy^3$

HCF = The lowest of indices of x and y

$$\boxed{HCF\ (a,b) = xy^2}$$

5. (b)

$$\frac{33}{2^2 \times 5}$$

on simplifying the denominator

$$\frac{33}{2^2 \times 5} = \frac{33}{4 \times 5} = \frac{33}{20} = 1.65$$

∴ It terminates ofter 2 decimal places.

BIOLOGY

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(SUBJECTIVE QUESTIONS)

1. Within the help of diagram show pulmonary circulation in man

2. Explain structure and functioning of nephron

3. Difference between xylem and phloem

4. How do living things gets their food

5. Explain the breakdown of glucose by various pathway.

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Answer & Solutions

1.

The pulmonary circulation is the portion of the circulatory system which carries deoxygenated blood away from the right ventricle of the heart, to the lungs, and returns oxygenated blood to the left atrium and ventricle of the heart. The term pulmonary circulation is readily paired and contrasted with the systemic

2.

The kidneys consist of a cluster of very thin-walled capillaries. Each cluster is associated with a cup-shaped end of a tube, in which filtered urine is collected. These basic filtering units of the kidneys are called nephrons. Each kidney possesses a large number of nephrons (approximately 1-1.5 million).

3.

Xylem transports only minerals and waters from the roots. Phloem transports food materials that are prepared by the green parts of the plants to other parts of the plant. Xylem is the dead tissues at maturity, but no cell contents. Phloem is the living tissue, but not with the nucleus.

4.

Plants are the living things that are producers, by making it themselves using sunlight, CO_2 ,water and chlorophyll. Other living organisms must find their own food because they cannot make it.

5.
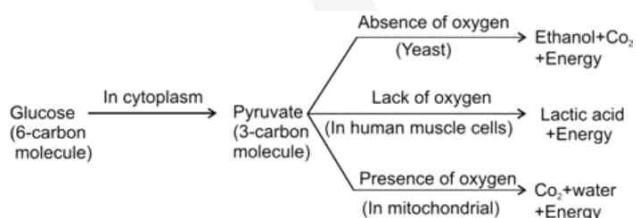
(Break down of glucose by various pathways)

(OBJECTIVE QUESTIONS)

1. Which of the following is the correct path taken by urine in our body?
   (a) kidney → ureter → urethra → bladder
   (b) kidney → bladder → urethra → ureter
   (c) kidney → ureter → bladder → urethra
   (d) bladder → kidney → ureter → urethra

2. It has been found that people livening in very high mountains have many more red corpuscles in their blood than people living in plains. Which one of the following best accounts for the phenomenon?
   (a) the cold climate stimulates the production of red corpuscles to keep the body warm
   (b) people of high mountains breathe more quickly
   (c) the low air pressure requires more red corpuscles to supply the body cells with oxygen,
   (d) the low air pressure in high mountains speeds up the blood circulation so that more red corpuscles are needed

3. The process of carrying food from the leaves to other parts of a plant is called:
   (a) transpiration
   (b) transportation
   (c) translocation
   (d) transformation

4. Which of the following is accomplished in a plant by utilising the energy stored in ATP?
   (a) transport of food
   (b) transport of water and minerals
   (c) transport of oxygen
   (d) transport of water, minerals and food

5. The procedure of cleaning the blood of a person by suing a kidney machine is known as:
   (a) ketolysis
   (b) hydrolysis
   (c) dialysis
   (d) photolysis

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Answer & Solutions

1. (c)

Urine collects from the nephrons and flows into the ureters. ... Urine exits the bladder and the body through the urethra. The kidneys, ureters, bladder, and urethra make up the urinary tract, the pathway through which urine flows and is eliminated from the body

2. (c)

Their RBC count is higher. Full-time residents at high altitudes also need supplementary oxygen at high altitudes, so their bodies evolve into carrying more red blood cells (RBCs), so more oxygen is carried into their bodies per liter of blood flow.

3. (c)

Translocation is the movement of materials in plants from the leaves to other parts of the plant. Nutrients, mainly sugars, are created in the leaves during photosynthesis. These are then transported throughout the plant through phloem, which are a long series of connected cells.

4. (a)

Translocation in Phloem take place by utilising the energy stored in ATP molecule. It take place in the sieve tube with the help of adjacent companion cells, both in upward and downward direction.

5. (c)

When your kidneys fail, dialysis keeps your body in balance by: removing waste, salt and extra water to prevent them from building up in the body. keeping a safe level of certain chemicals in your blood, such as potassium, sodium and bicarbonate. helping to control blood pressure.