Galvanic Experiments

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Frog – prepared – Exp.t 4 –

1.st with the ~~Electrical machine~~

the frog laid on a plate

the arm nerve touched with

the thumb, and the muscle with

any metal –

2. The arm on a plate of

Zinc and the muscle on a

plate of Silver. Connect the

plates with any metal –

3. Hold the prepared frog by

one leg, from a common window

between the other leg and the arm

the hanging leg will sometimes

strike up the hand of the experimenter

4. Place two wine glasses full of water near but not touching each other. Put the lower extremities in one glass, and the nerves in the other. Form a contact between the two bodies with silver. Or put the fingers of one hand into the water of the muscle glass, and with a piece of silver in the other hand touch the cut nerve — violent convulsions — sometimes jumps out of the glass

5. Lay a live flounder flat on a pewter plate, or on tinfoil and a plate of silver on the upper side, a nerve well uncovered, connect the upper and lower by any metal evident signs of being affected

6. Put a piece of zinc on the upper side of the tongue and silver on the lower side, a peculiar sensation — zinc acid — silver alkaline —

7. Or put the zinc below the upper lip and the gum, and the silver on the tongue — flash of light — different sensations

8. + Porter out of a pewter mug different from a glass

9 + Zinc in water not acid add silver — soon

10. + Iron ~~pails~~ copper the thing

11. + Ancient coins of one metal long preserved — compound, oxide

12 + Silver spoons – brass & forks together – latter rusted

13. + Mercury kept long clear – amalgam soon tarnished

14 + Pewter long bright – Pewter soon tarnished

15 + Pure gold and silver expos to the atmosphere neither oxidated – with copper iron tarnished

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~~16~~ Voltaic pile – Describe

16 – Shock – several ways

17. Flash of light – Chemical

18. Two piles – 2 made of connected top and bottom

19. Animals living and dead submitted to Galvanism –

20. Water decomposed – 3 Cups
1st Simple tube –
2 tube and cup
3. Syphon tube –

21 If an iron wire be connected with the Zinc pole, only Hydrogen gas will be produced

22 With a solution of acetate of lead in distilled water no hydrogen gas is produced – lead reduced Dr. Faid

23 – Sulphat of Copper – metallic bottom – adhere to the wire –

24. Nitrate of Silver. from the Arbor Dianæ

25. Tincture of Litmus. in Distd water – Gold wire – A fine red line rises from the Zinc wire – soon the whole fluid near this wire becomes red: the fluid about the Silver wire looks ~~more~~ of a deeper blue than before, the slight tinge of purple being destroyed –

26. If the ~~ph~~ tube be filled ~~full~~ with distilled water tinged with tincture of Brazil wood, the fluid surrounding the Silver wire particularly, loses its coloured, becomes purple, and afterwards as deep as can be produced by Amⁿ; while the fluid about the Zinc ~~pole~~ wire ~~was~~, becomes almost colourless –

N.B. These two experiments shew that an acid (Nitric) is produced at the Zinc wire, and an Alkali (Ammonia) at the Silver wire –

27. To a dilute solution of the Nitrate of Silver add pure Ammonia till the mixture smells strongly of the latter – If the tube Silver wire – much gas from the Silver ~~wire~~ Pole – little or none from the Zinc – after some time grey or white flakes (metallic Silver) by the Silver pole, and a dark grey

Powder at the zinc wire — After some hours the a considerable quantity of Metallic Selen was deposited and the zinc wire was encrusted with a black substance, in removing this with the finger it exploded tho' slightly and the ~~selen~~ wire was now coated, full of holes. When dry and touched with a knife it exploded with violent (fulminating selen)

28. The last experiment may be performed with pure Am.ª instead of the Nitrate of Selen, and with the same result. —

29. The last experiment with platinum wire a quantity of Gas was produced from both wire, which is a mixture of Hydrogen & Nitrogen Gas in the ∴ of Am.ª —

30. Pieces of Selen and Zinc of 1.2 inch square and 10 in number — with concentrated Nitric acid gave a shock which numbed the fingers — Acetic acid was used.

31. Held a prepared frog by one leg and bring either the other or the arm to one end of a pile without completing the circuit, the frog is violently agitated, but soon after loses its irritability —

Deflagrate –

32. Fix a small iron wire to the negative conductor and bring it into contact with the positive end of the battery – it will be deflagrated

33. Connect one conductor with a vessel containing clean mercury – Bring the small wire into contact with the surface of the mercury – Deflag.

33. Attach one of the conductors with charcoal, to which apply the wire to be melted – Defl.

34. Cold lead on charcoal – Defl.

35. Steel wire fixed to the zinc pole and brought into contact with the copper pole, battery sparks 1½ inch in length in the form of a rose shot out incessantly or sparks so rotatory formed and appeared tipped with flame. They were all red, but the point of contact was black, and of the size of a pin head, and the whole out line was distinctly visible in day light – It seemed to make no difference whether the wire was held in the hand, or by an insulated handle – (22 cines 8 inch square cines – Berlin –

N.B. The snaps accompanying the sparks were heard through three rooms – door open – door room soldered to the poles –

36. The different metals ~~burn~~ in leaves or fine wire burnt — — may be struck on the ball of one conductor and brought to the mercury in contact with the other conductor — or with charcoal — fine leaf burns with the great brilliance, throwing out red rays of more than six inches in length — All these more brilliant in Oxygen Gas. —

37. Gunpowder — Hydrogen Gas — Phosphorus, fulminating Mercury, lead on Charcoal, all fired by the spark with the Mr Daggs —

38. In many experiments it is best to let one of the conductors terminate in a vessel of water — when both conductors are thus disposed and the hands plunged into the two glasses the shock is different from that felt in the common way —

39. Raises the Epidermis, and effects one or two days — sufficiently strong for some medical purposes.

40. The galvanic shock is strongest when the person who receives it is insulated.

41. The belling is also more powerfull when insulated. —

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37. Gunpowder — Hydrogen Gas — Phosphorus, fulminating Mercury, lead or Charcoal, all fired for 4 hours Mr Day —

38. In many experiments it is best to let one of the conductors terminate in a vessel of water — when both conductors are thus disposed and the hands plunged into the two glasses the shock is different from that felt in the common way —

39. Rain the Epidemic, and especially one or two series — sufficiently strong for common medical purposes.

40. The galvanic shock is stronger when the person who receives it is insulated.

41. The battery is also more powerfull when insulated. —

42. The Zinc pole produces a sour taste on the tongue, the other or copper more Alkaline. The former is both more intense and more lasting than the latter. —

43. Flash of light from the Zinc pole is light blue or greenish, from the other fiery or reddish.

44 Put one or two thin slips of Phosphorus in the wick of a candle and light it with Galvanism

45. Bengalee Rosin set on fire by Galvanism —

46 Lead or tin melted — wire —

47. Touch the wick of a candle with ~~Sp.~~ Alcohol or Turpentine and apply Galvanism

48. Mixture of Oxi: m: of Potash and Arsenic fired with Galvanism — Charcoal rubbed

49. Oxi: m: of Potash and Sulphur exploded with Galvanism

50. Ditto with phosphorus

51. Phosphorus in thin shreds wrapped round with fibre of cotton

52. Cotton dipped in oil turpentine

52. Resin. Camphor Elastic gum inflamed by Galvanism

53. Put filings of Zinc, copper Antimony, iron & steel into an ignited Charcoal cupped and blow a stream of oxygen Gas from a bladder on the bellows, they will burn rapidly —

54. Electric Cannon. —

55. Bengalla house burnt

56. Powder house ~~explode~~ blown up.

57. If the positive pole be armed with Gold leaf, and the negative with a bit of charcoal on forming the communication the Gold leaf burns brilliantly and the charcoal remains untouched; but if the Gold leaf be placed on the negative side and the charcoal on the positive, the charcoal burns and the G. leaf is melted

58. If the eye be made to communicate with the positive pole it sees objects red, larger and more distinct, with the negative pole, blue smaller and more confused

59. The ear in contact with the positive all sounds more grave, with the negative more acute —

60. The positive pole disposes metals to combine with Oxygen the negative with Hydrogen.

N.B. The last four Experiments Mr. Ritter's

61. If the prepared limbs of a frog be dipped in salt water, the contractions are more violent —

62. The contractions of the muscles of a living frog by galvanism is much less than when ~~the~~ Animal is dead —

63. The following compositions may be fired by applying a glass tube dipped into sulphuric acid — ~~Lewis~~ These Experiments may be performed as connected with the Galvanic Battery

Exp.

1	Ox: m: of P. Ash	3	parts
	Sulphur	1	—
2	Ox: m: P a —	3	
	Charcoal —	$\frac{1}{2}$	
	Sulph. —	$\frac{1}{2}$	
3	Ox: m: P: a.	1	
	Arsenic —	1	
4.	Ox: m: P, a. —	3	
	Sugar —	1	
5.	Ox: m: P: a	3	
	Charcoal —	1	
6.	Ox: m: P: a	$1\frac{1}{2}$	
	Gun powder	3.	

A pistol primed with this comp. was fired —

7. ex: m: P. A and Phosphor

8. Hydrogen Gas – Bladder with stop cock and tube – Tube moistened with sulphuric acid and touched with ex: m: P. A. Press the bladder – Gas takes fire

9. Acetic acid produces a considerable deflagration. —

64. A tea spoon left immersed in either the white or yolk of an egg suffers no change of colour; but in the act of eating, the spoon is discoloured, the end which goes farthest into the mouth is of the deepest black — Sulph Hydrogen Gas. —

65. If ~~the~~ two pieces of Charcoal partially covered with cotton be fixed on the conducting wires, the cotton will be fired either by itself, or when sprinkled with charcoal —

66. A wire connected with the Zinc end had the other immersed in a vessel of water. A wire from the copper end ~~wet~~ when brought near the surface of the water gave a brush or jet of light = $\frac{1}{2}$ ft with a snap heard in an adjoining room like the hissing of red hot iron in water — warm the conductor only a small Globular spark, no snap — W. Cruikshank —

Galvanic Apparatus.

Additional observation

The small ~~fig~~ machine is best put up in three Collision pieces. The first and second may be joined by the triangular piece at bottom. The 2 and 3 at top by the rectangular piece of Zinc. The 2 and third pieces should be well insulated at bottom, which is best done by placing them on glass wiped perfectly dry.

If common salt be used, the solution should be nearly saturated. When a greater power is wanted and for a short time a pretty strong solution of Muriate of Ammoniac may be used. But what I have found best of all for soaking the

Acids is mixed and diluted with water, in the proportion of about an ounce of acid to a pint or rather more of water. With this the machine acts uniformly and powerfully and the plates are ~~very~~ very easily cleaned. —

Great attention should be paid to cleaning the plates, particularly the Zinc on the oxidation of which, alone, the power of the machine entirely depends.

The Gold wires, ~~being now foul of filth~~ are now laid aside and two brass conductors with large handles are substituted in their place. These very much encourage the shock, and are, in every respect, far preferable to plain wires.

The Galvanic shock may be readily sent thro' any part of the body, like the common Electric shock —

Example

Suppose the whole of the right side is to be Galvanized — Place the lead weight in contact with the ~~X~~ bottom of the ~~Zinc~~ Coll. of the battery as above described. To this hook a wire of any kind of metal, to the other end of this ~~metal~~ wire fix a broad piece of tinfoil sprinkled with salt water and laid on the floor. On the tinfoil place the bare right foot. Take now one of the large conductors in the right hand well wetted with salt water and touch the top of the first pile, the Galvanic discharge will pass along the right side, up if the ~~first~~ pile ends with upper and down if with with Zinc.

* It is best to paste the tinfoil on a board. —

The Galvanic machine has no tendency to grow old or weaker than at first. It will continue to act with the same power, till the plates be corroded through, which, if proper care be taken, will not happen, I think, in ten years tho' used every day.—

When the same cloths have been used two or three times, they may be washed with hot water, to clear them of oxid.

It is best, on every occasion, to put up the whole battery of 100 pair, for when a less power is wanted, such as in galvanizing the Eyes, Ears &c, this may be easily obtained, in any proportion, by applying one of the conductors to any intermediate points of any of the piles.—

In the rainy season of the year, the machine will act with equal power for near three days. It is best, however, to put it up in the morning and take it down in the afternoon of next day. In this case, if ~~the muriat~~ muriatic acid has been used, the machine may be put up twice or even thrice without cleaning the plates. — Any weak acid may be used, but no ~~oil~~ oil, in cleaning.—

When both ears or both eyes are to be Galvanized, it is more convenient, and it may possibly prove not less effectual, to Galvanize only one at a time, which may be readily done, by receiving the shock with the hand of the opposite side.

~~J. Dimsdale~~

The shock depends entirely on the number, without having any regard to the surface of the metals. —

— The acid liquor which remains after putting up the battery may be returned into the bottle for next occasion

— Acid ready prepared may be had at 6 Pence the Pint quart bottles, the bottles not included —