

Les Métaux Alcalino-Terreux

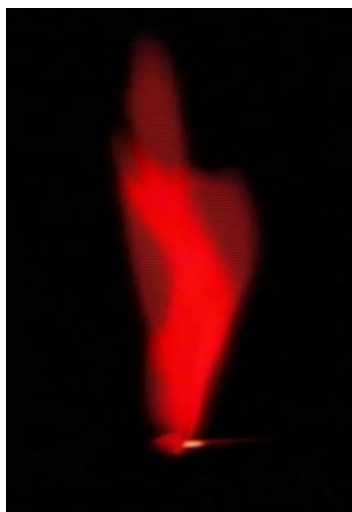
- Isolés par Sir Humphry Davy (Ba, Mg, Ca, Sr) par électrolyse de sels (env. 1808).
- Plus haut Pf, plus durs et plus denses que les métaux du Groupe I.
- Moins réactifs que les métaux du Groupe I mais réagissent quand-même avec beaucoup d'éléments électronégatifs.
- **Uniquement au degré d'oxydation +2** dans les composés.
- **Be peut former des liaisons covalentes** (p.ex. BeCl_2) mais les autres forment principalement des composés ioniques.
- Du fait de leur forte réactivité, on ne les trouve pas sous leur forme élémentaire dans la nature.

Element	Symbol	Atomic number	Electronic configuration
Beryllium	Be	4	$[\text{He}]2s^2$
Magnesium	Mg	12	$[\text{Ne}]3s^2$
Calcium	Ca	20	$[\text{Ar}]4s^2$
Strontium	Sr	38	$[\text{Kr}]5s^2$
Barium	Ba	56	$[\text{Xe}]6s^2$
Radium	Ra	88	$[\text{Rn}]7s^2$

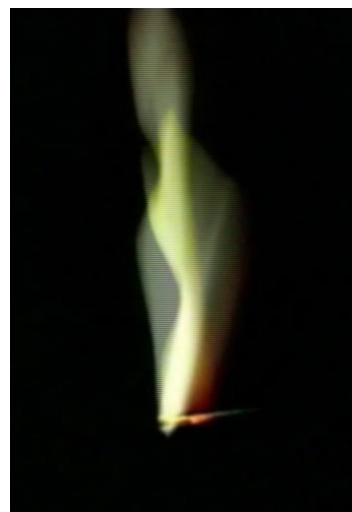
Tests de Coloration de Flamme



Calcium
rouge-orangé

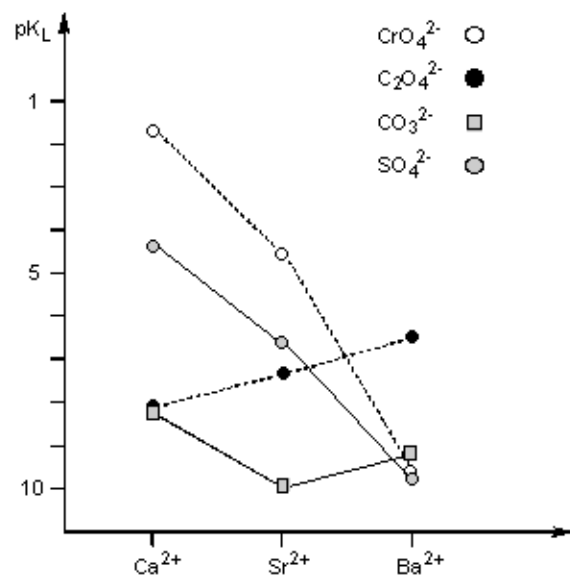
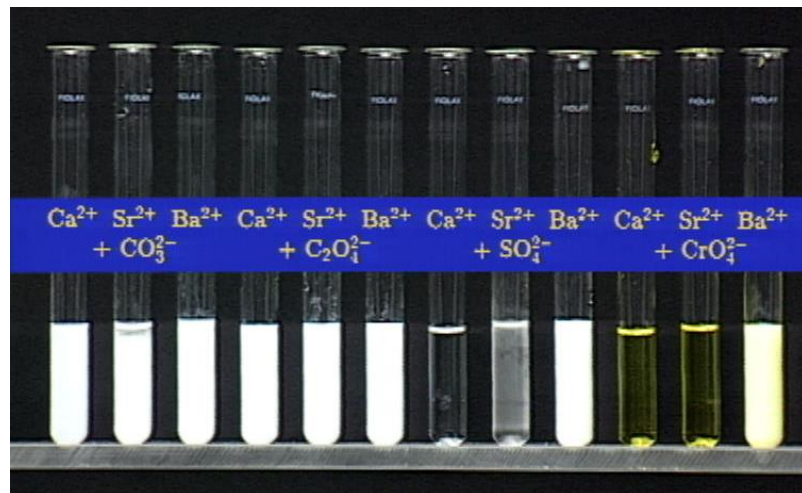


Strontium
rouge-carmin



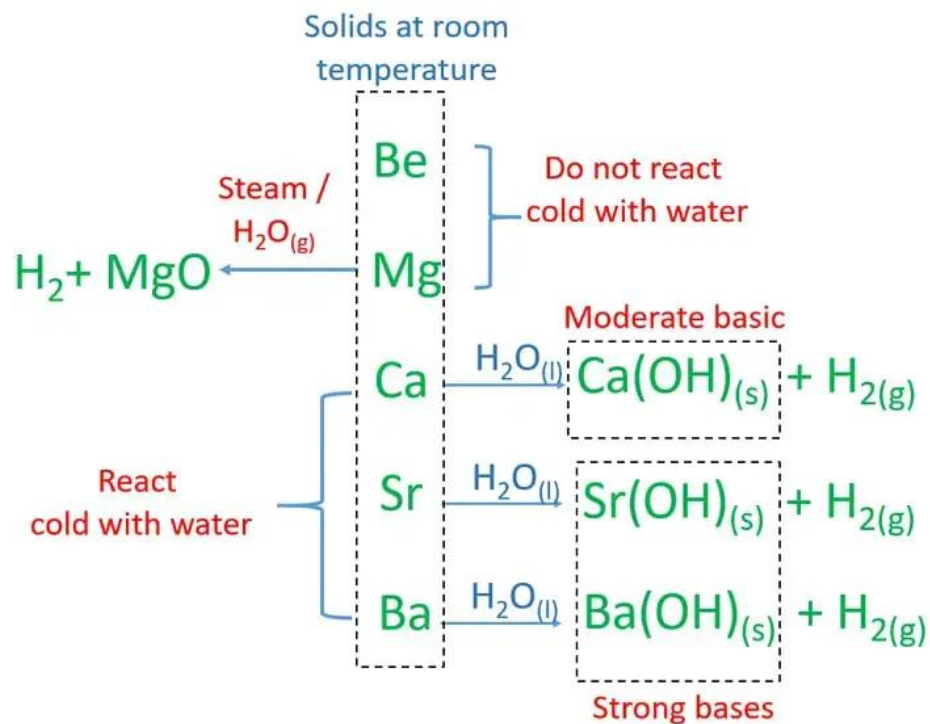
Barium
jaune-vert

Solubilité des Sels Alcalino-Terreux



- Les sels d'anions à charge unique sont généralement solubles.
- Les sels d'anions à charges multiples sont généralement insolubles en raison de la forte énergie de réseau des sels du type $M^{2+}X^{2-}$.
- La concordance des tailles joue un rôle : les sulfates des plus petits cations Mg^{2+} et Ca^{2+} sont solubles alors que ceux des cations plus gros Sr^{2+} and Ba^{2+} sont insolubles.
- On trouve un minima de solubilité pour le strontium (carbonates) et le calcium (oxalates). Ce comportement variable démontre le fait que la solubilité des composés salins dépend d'autres facteurs que simplement le rayon des ions concernés.

Les Métaux Alcalino-Terreux et l'Eau



BARIUM INTO WATER

Ca, Sr, et Ba réagissent avec l'eau mais pas Be et Mg.

Le Béryllium

- Le béryllium est présent dans quelque 30 espèces minérales, par exemple le béryl (aluminosilicate). Selon les impuretés incorporées dans le cristal, le béryl forme une série de pierres précieuses comme l'émeraude ou les aquamarines. Le béryl pur est incolore, et l'addition de chrome permet de le rendre vert.
- Le béryllium étant transparent aux rayons X, il est utilisé dans les fenêtres à rayons X.
- Le béryllium est utilisé comme agent d'alliage pour produire du cuivre au béryllium (Cu avec 6-7 % Be), qui est aussi dur que l'acier et qui possède les mêmes conductivités thermique et électrique que Cu. Il est utilisé comme matériau structurel pour les avions à grande vitesse, les missiles, les engins spatiaux, et les satellites de communication.
- Be est hautement toxique : inhaler de la poussière ou des vapeurs contenant du béryllium provoque une inflammation pulmonaire ('béryllose').



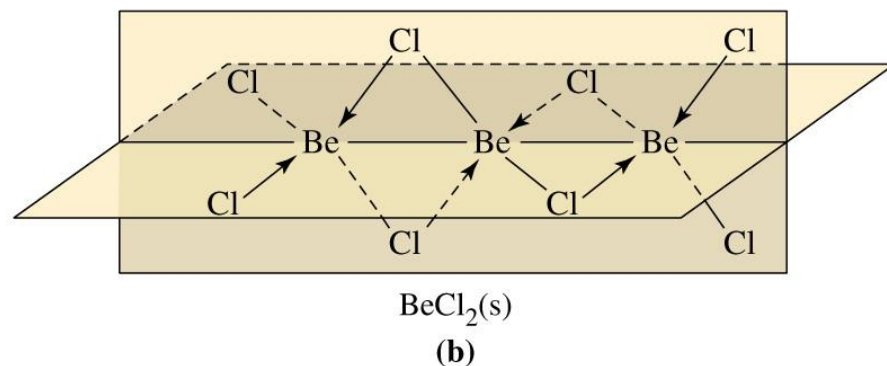
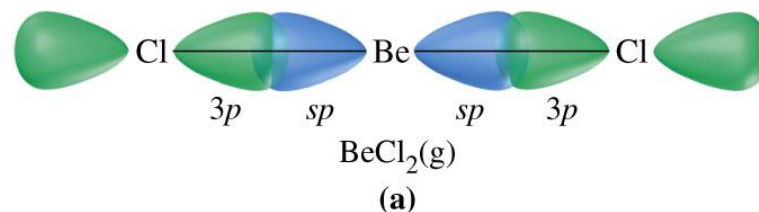
Béryl vert



Bloc de cuivre au béryllium

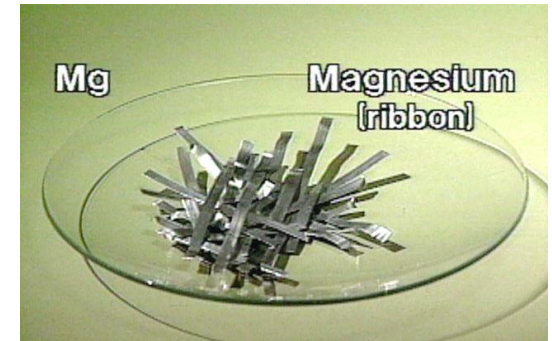
Les Composés du Béryllium

- Le béryllium forme des liaisons à caractère covalent.
- BeCl_2 forme des unités Cl-Be-Cl linéaires en phase gazeuse et est un mauvais conducteur quand on le fait fondre (pas de formation d'ions). BeCl_2 est déficient en électrons et forme ainsi des chaînes en phase solide.

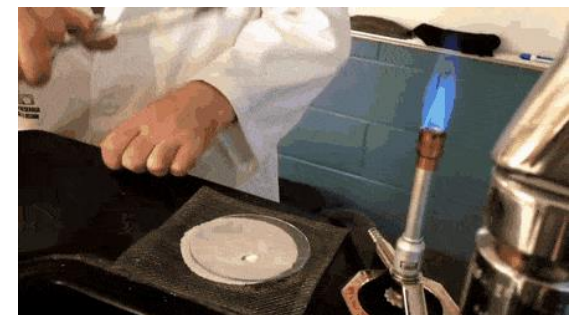


Le Magnésium

- Le magnésium est le huitième élément le plus abondant dans la croûte terrestre. On ne le trouve pas à l'état élémentaire, mais sous forme de grands dépôts de magnésite (MgCO_3), de dolomite ($\text{CaMg}(\text{CO}_3)_2$), et d'autres minéraux.
- L'eau de mer contient 0.15 % de Mg^{2+} .
- Le magnésium est un métal léger, blanc-argenté et assez solide. Il se ternit légèrement à l'air, et du magnésium finement divisé s'enflamme facilement en le chauffant à l'air et brûle d'une flamme blanche aveuglante.
- Il est d'un tiers plus léger que l'aluminium et ses alliages avec Al servent essentiellement à la construction d'avions et de missiles. Le métal améliore les propriétés mécaniques de l'aluminium.
- 80 % de la production mondiale est obtenue par électrolyse de MgCl_2 .

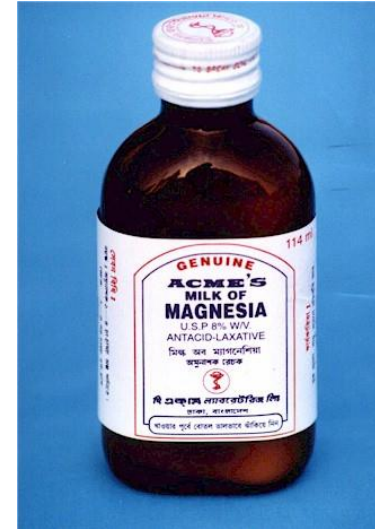
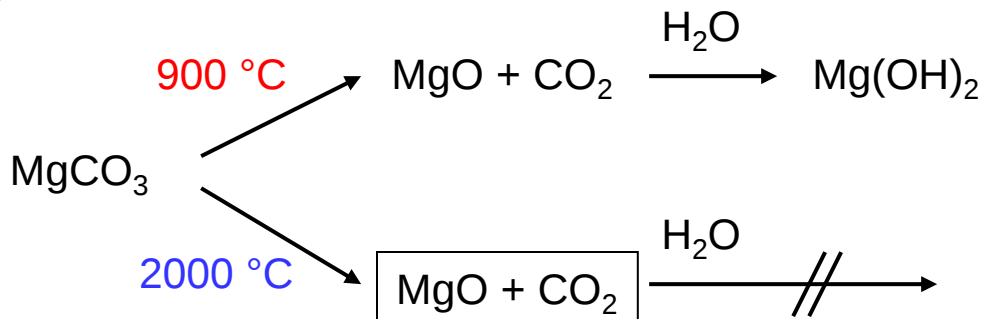


Body made out of Mg alloy.



La Magnésie (MgO)

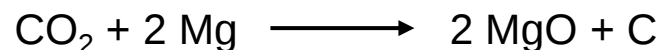
- Haut Pf (2830 °C), haute conductivité thermique et isolant électrique.
- Synthèse : décomposition thermique de MgCO_3 . La réaction a lieu à 800 – 900 °C et produit de la magnésie caustique. Lorsqu'on chauffe jusqu'à 1700 – 2000 °C on obtient un matériau hautement résistant au feu, utilisé pour couvrir des fourneaux ou des corps de chauffe.
- La magnésie caustique s'hydrate lentement pour former le modérément soluble Mg(OH)_2 ('lait de magnésie') – un anti-acide utile.



Réaction du Magnésium avec CO₂

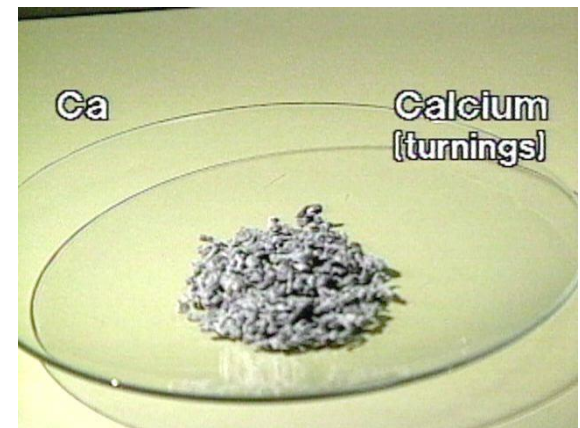


Un trou est percé au centre d'un bloc de glace carbonique et est rempli de bandes de magnésium. Le métal est allumé avec un bec Bunsen. Aussitôt que le métal brûle en dégageant une lumière blanche aveuglante, il est recouvert d'un second bloc de glace carbonique. Tandis que la réaction progresse, le bloc entier commence à luire. Une fois la réaction terminée, on trouve le carbone produit au centre du bloc.



Le Calcium

- Le calcium est le cinquième élément le plus abondant dans la croûte terrestre.
- C'est le métal le plus abondant dans le corps humain (~ 1.2 kg chez un adulte moyen – principalement dans les os)
- A cause de sa forte réactivité avec les matériaux communs, la demande en calcium métallique est très faible. Il est utilisé pour retirer l'oxygène, le soufre et le carbone de certains alliages.



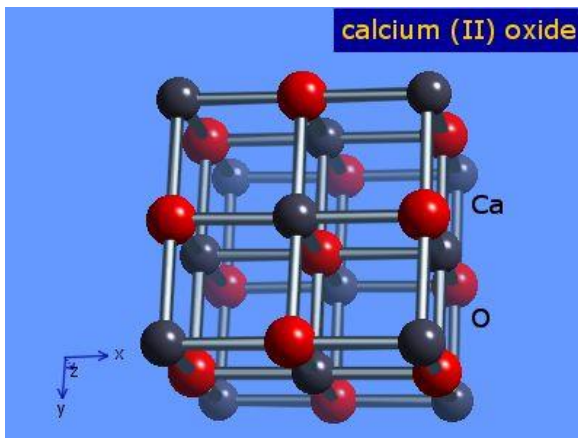
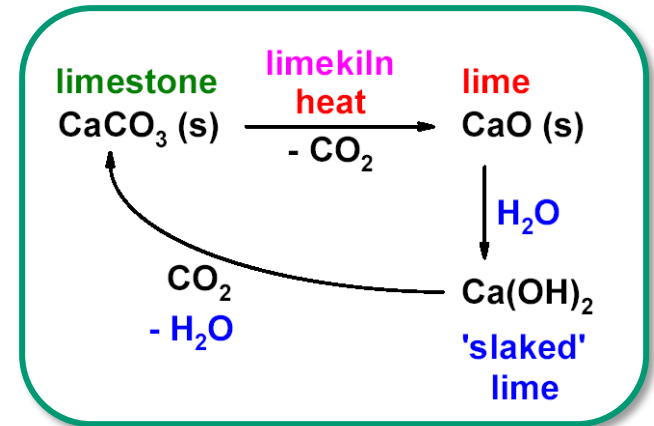
Le Chlorure de Calcium (CaCl_2)

- Cristallise à partir d'une solution sous forme d'hexahydrate $[\text{Ca}(\text{OH}_2)_6]\text{Cl}_2$. Contrairement à $[\text{Mg}(\text{OH}_2)_6]\text{Cl}_2$ il peut être déshydraté en CaCl_2 .
- La dissolution de $[\text{Ca}(\text{OH}_2)_6]\text{Cl}_2$ est un processus endothermique ($\Delta H^\circ = \text{positive}$) → peut être utilisé pour refroidir des solutions. Avec de la glace et $[\text{Ca}(\text{OH}_2)_6]\text{Cl}_2$ il est possible de descendre jusqu'à -55°C .
- La dissolution du CaCl_2 est un processus exothermique ($\Delta H^\circ = \text{négative}$) → peut être utilisé pour fondre de la glace.



La Chaux (CaO)

- Obtenue par décomposition thermique du calcaire ('four à chaux').
- La 'chaux éteinte' est utilisée en agriculture pour ajuster le pH du sol.
- Production d'acétylène (voir plus loin).
- Utilisée auparavant pour l'éclairage des théâtres. CaO est thermoluminescent, d'où le terme 'limelight' (les feux de la rampe).



La décomposition du calcaire se fait dans un long four rotatif

Le Carbonate de Calcium (CaCO_3)

- Grande importance historique et actuelle en temps que matériau de construction.
- Disponible sur toute la planète sous trois formes : la craie, le calcaire et le marbre. Tous trois consistent en une variété de CaCO_3 appelée *calcite* (autres variétés: *aragonite* et *vaterite*).
- Sensible aux pluies acides.



gypsum
more soluble 'stone leprosy'



Craie
'Les falaises blanches de Douvres'



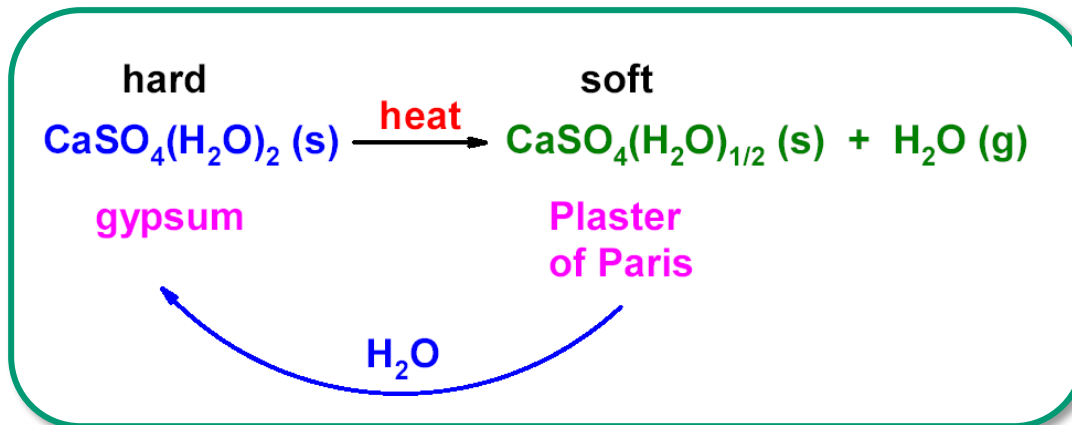
Calcaire



Marbre

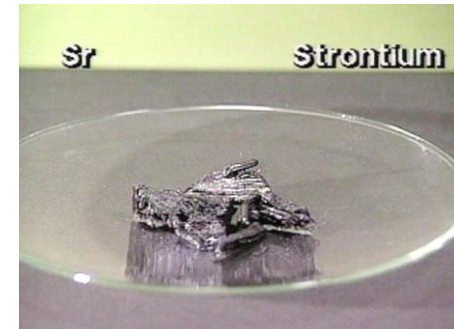
Le Gypse ($\text{CaSO}_4 \times 2 \text{H}_2\text{O}$)

- Le sulfate de calcium est présent dans la nature sous forme de gypse et de CaSO_4 .
- CaSO_4 cristallise à partir d'une solution aqueuse sous forme de dihydrate $\text{CaSO}_4(\text{H}_2\text{O})_2$.
- La déshydratation fournit le semi-hydrate mou $\text{CaSO}_4(\text{H}_2\text{O})_{0.5}$ ('plâtre de Paris'). La réhydratation fournit des cristaux de gypse durs et emboîtés.
- Également fréquemment utilisé comme 'craie' pour tableaux noirs (plutôt que de la vraie craie CaCO_3).



Le Strontium

- Le strontium est obtenu à partir de deux de ses minerais les plus communs, la célestite (SrSO_4) et la strontianite (SrCO_3).
- Le chlorure de strontium, généralement mélangé avec du chlorure de potassium (KCl), est fondu et électrolysé, donnant du strontium et Cl_2 .
- Sels du strontium → couleur rouge dans les feu d'artifice.
- Le strontium-90, un isotope radioactif du strontium, est un résidu habituel des explosions nucléaires. Il est particulièrement ravageur car il possède un temps de demi-vie relativement long (28 ans) et est absorbé par le corps, où il s'accumule dans le squelette.

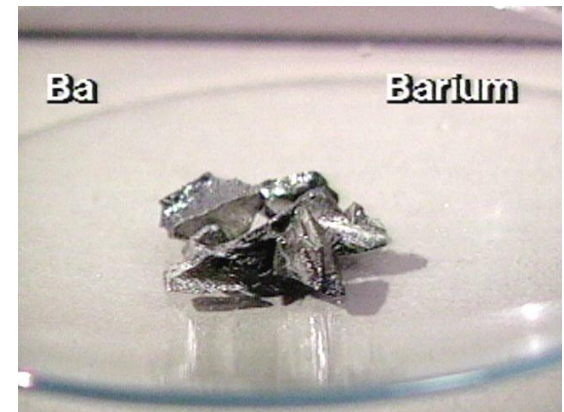


Celestite



Le Baryum

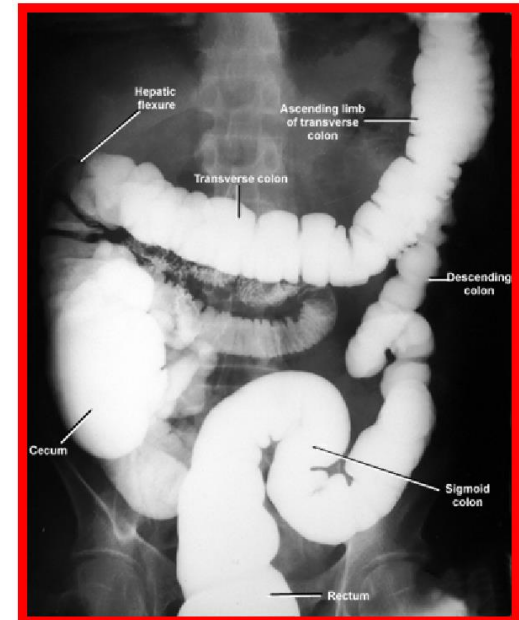
- On trouve le plus souvent le baryum sous forme de minerais : la baryte (BaSO_4) et la whitéríte (BaCO_3).
- Baryum de haute pureté est produit par électrolyse du BaCl_2 .
- Peux d'applications pour le baryum métallique.
- Ses sels solubles sont hautement toxiques.



Barite

Le Sulfate de Baryum (BaSO_4)

- BaSO_4 est le plus important composé naturel du baryum.
- Combiné à de l'oxyde de zinc (ZnO), il fournit un pigment blanc appelé 'lithophone'. Avec du sulfate de sodium (Na_2SO_4) on obtient un autre pigment blanc connu sous le nom de 'blanc fixe'.
- La mauvaise solubilité de BaSO_4 le rend utile pour l'analyse quantitative de l'ion SO_4^{2-} .
- Peut être utilisé pour l'imagerie aux rayons X du colon.
- Bien que tous les composés du baryum soient des poisons, le sulfate de baryum peut être ingéré sans risques car il est insoluble dans l'eau.



BaSO_4 est un agent radio-opaque
(il bloque les rayons X)

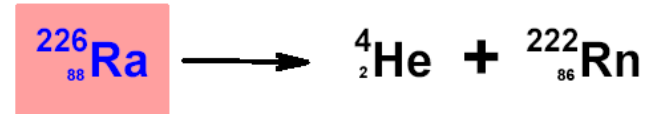
Le Radium

- Découvert par Pierre et Marie Curie en 1898.
- Puissant émetteur α : brûle la peau sans chaleur et irradie par lui-même en ionisant l'air environnant.
- Rapidement adopté par la société pour de multiples usages :
 - a) peinture lumineuse pour les cadrans des montres
 - b) curatif pour des maladies comme l'anémie ou le cancer.
- Il fut montré plus tard que ses radiations sont extrêmement dangereuses : Marie Curie est morte de leucémie, tout comme sa fille Irène (également lauréate du prix Nobel) et beaucoup d'ouvriers utilisant de la peinture au radium.



Marie Curie
(1867 – 1934)

'Dans la vie, rien n'est à craindre,
tout est à comprendre.'



Radium et Beauté

12 New York Tribune

November 10, 1918

Radium and Beauty

HERE are the first toilet preparations to embody Actual Radium, an astonishing new force for betterment, applied as an aid to Beauty. Learn how the amazing Energy of Radium has proved a boon to the human skin. Learn what Radium actually means to Beauty and how its power is employed in "Radium" Preparations. Study our \$5,000 guarantee. Then turn to "Radium" Toilet Requisites. When you have used, enjoyed and tested them you will adopt them as your own first aid to Beauty.

PREHISTORIC woman first discovered her image in some quiet jungle pool. Ever since Beauty has engaged the world's attention.

Radium, though new to the world, is no less of absorbing interest. Its secrets have amazed and thrilled us all.

Who would have imagined that these two subjects would come up so hand in hand? Yes, in Radium, Science has discovered a revolutionary Beauty Secret.

Current books on Radioactivity. Any number of them are in our public libraries. They will show you that Radium possesses an even more power for human betterment.

The most marvellous of Radium's powers is its continuous stream of Energy Rays. An Energy ray never diminishes, never ceases day or night, year in, year out. A Radium atom times more powerful than any other known.

These Radium Rays are particularly valuable to effect upon the human skin. Dr. Louis Wickham and Dr. Joseph, specialists in the St. Lawrence and St. Louis Hospitals of Paris, have proved what Radium will do for even the most devoted skin disease.

Rays of Radium, by fast, accurate and directly set living matter with which they come in contact. They are "corrected" by the human system as harmoniously as is sunlight by the plant.

The wonderful force for betterment has been named "Radium" Toilet Requisites, thus placing the power of Radium at the service of every woman who uses a face cream or powder, but not as a soap.

"Radium" Toilet Requisites are delightfully dainty and distinctive. They have no equal.

and exclusive fragrance all their own, a perfume not for sale to any market. They are the first and only preparation for the toilet to contain Actual Radium—guaranteed pure to Beauty.

Every "Radium" Preparation is guaranteed under \$5,000 penalty, to contain a definite amount of Actual Radium, and to retain its Radioactivity for at least twenty years. See Guarantee sheet.

In England, "Radium" Preparations are a source of never-ending challenge. They are not by word, but by deed, and by the results they produce in the human skin.

The greatest boon ever offered to those who value perfection of complexion, youthful beauty, and a healthy skin and beautiful hair.

Each and every "Radium" Beauty Aid is the product of a famous French scientist, formerly with the Radium, you would choose "Radium" Preparations for themselves, because of the only combination of the cream-like, delicate texture of the powder and the lasting, lasting fragrance.

When in this position, as toilet preparation, to add the power of Radium, the highest level of Beauty Culture is reached.

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Radium

Toilet Requisites

"Radium" Toilet Requisites are necessarily lighter in price. This must be expected in preparations containing the finest ingredients only, plus a delicate quantity of Actual Radium. But the greater benefits obtained from "Radium" Preparations would justify an even higher price. The best is always the cheapest and goes further.

It is easy to prove the superiority of "Radium" Preparations. Try them. See how smoothly the Vanishing Cream rubs in.

Notice how your complexion improves with "Radium" Pâte de Velours (night cream).

See how beautiful only the face powder blends with the skin. Here, actually, it follows. Again, note the beautiful contrast of the face. Note the effects produced by the Hair Tonic.

Then remember that each preparation has the power to work for betterment the power of Actual Radium. It is easy to apply these tests.

Purchase "Radium" Toilet Requisites at any of the leading department and drug stores. If you are not delighted with them, communicate with us and we will see that your money is refunded.

Enjoy the strong, clean fragrance.

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1. Pâte de Velours (Night Cream) 2. Vanishing Cream 3. Face Powder 4. Hair Tonic 5. Shampoo 6. Hair Oil 7. Hair Cream 8. Hair Lotion 9. Hair Spray 10. Hair Gel 11. Hair Wax 12. Hair Pomade 13. Hair Butter 14. Hair Cream 15. Hair Lotion 16. Hair Spray 17. Hair Gel 18. Hair Wax 19. Hair Pomade 20. Hair Butter 21. Hair Cream 22. Hair Lotion 23. Hair Spray 24. Hair Gel 25. Hair Wax 26. Hair Pomade 27. Hair Butter 28. Hair Cream 29. Hair Lotion 30. Hair Spray 31. Hair Gel 32. Hair Wax 33. Hair Pomade 34. Hair Butter 35. Hair Cream 36. Hair Lotion 37. Hair Spray 38. Hair Gel 39. Hair Wax 40. Hair Pomade 41. Hair Butter 42. Hair Cream 43. Hair Lotion 44. Hair Spray 45. Hair Gel 46. Hair Wax 47. Hair Pomade 48. Hair Butter 49. Hair Cream 50. Hair Lotion 51. Hair Spray 52. Hair Gel 53. Hair Wax 54. Hair Pomade 55. Hair Butter 56. Hair Cream 57. Hair Lotion 58. Hair Spray 59. Hair Gel 60. Hair Wax 61. Hair Pomade 62. Hair Butter 63. Hair Cream 64. Hair Lotion 65. Hair Spray 66. Hair Gel 67. 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Hair Butter 385. Hair Cream 386. Hair Lotion 387. Hair Spray 388. Hair Gel 389. Hair Wax 390. Hair Pomade 391. Hair Butter 392. Hair Cream 393. Hair Lotion 394. Hair Spray 395. Hair Gel 396. Hair Wax 397. Hair Pomade 398. Hair Butter 399. Hair Cream 400. Hair Lotion 401. Hair Spray 402. Hair Gel 403. Hair Wax 404. Hair Pomade 405. Hair Butter 406. Hair Cream 407. Hair Lotion 408. Hair Spray 409. Hair Gel 410. Hair Wax 411. Hair Pomade 412. Hair Butter 413. Hair Cream 414. Hair Lotion 415. Hair Spray 416. Hair Gel 417. Hair Wax 418. Hair Pomade 419. Hair Butter 420. Hair Cream 421. Hair Lotion 422. Hair Spray 423. Hair Gel 424. Hair Wax 425. Hair Pomade 426. Hair Butter 427. Hair Cream 428. Hair Lotion 429. Hair Spray 430. Hair Gel 431. Hair Wax 432. Hair Pomade 433. Hair Butter 434. Hair Cream 435. Hair Lotion 436. Hair Spray 437. Hair Gel 438. Hair Wax 439. Hair Pomade 440. Hair Butter 441. Hair Cream 442. Hair Lotion 443. Hair Spray 444. Hair Gel 445. Hair Wax 446. Hair Pomade 447. 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Hair Butter 700. Hair Cream 701. Hair Lotion 702. Hair Spray 703. Hair Gel 704. Hair Wax 705. Hair Pomade 706. Hair Butter 707. Hair Cream 708. Hair Lotion 709. Hair Spray 710. Hair Gel 711. Hair Wax 712. Hair Pomade 713. Hair Butter 714. Hair Cream 715. Hair Lotion 716. Hair Spray 717. Hair Gel 718. Hair Wax 719. Hair Pomade 720. Hair Butter 721. Hair Cream 722. Hair Lotion 723. Hair Spray 724. Hair Gel 725. Hair Wax 726. Hair Pomade 727. Hair Butter 728. Hair Cream 729. Hair Lotion 730. Hair Spray 731. Hair Gel 732. Hair Wax 733. Hair Pomade 734. Hair Butter 735. Hair Cream 736. Hair Lotion 737. Hair Spray 738. Hair Gel 739. Hair Wax 740. Hair Pomade 741. Hair Butter 742. Hair Cream 743. Hair Lotion 744. Hair Spray 745. Hair Gel 746. Hair Wax 747. Hair Pomade 748. Hair Butter 749. Hair Cream 750. Hair Lotion 751. Hair Spray 752. Hair Gel 753. Hair Wax 754. Hair Pomade 755. Hair Butter 756. Hair Cream 757. Hair Lotion 758. Hair Spray 759. Hair Gel 760. Hair Wax 761. Hair Pomade 762. Hair Butter 763. Hair Cream 764. Hair Lotion 765. Hair Spray 766. Hair Gel 767. Hair Wax 768. Hair Pomade 769. Hair Butter 770. Hair Cream 771. Hair Lotion 772. Hair Spray 773. Hair Gel 774. Hair Wax 775. Hair Pomade 776. Hair Butter 777. Hair Cream 778. Hair Lotion 779. Hair Spray 780. Hair Gel 781. Hair Wax 782. Hair Pomade 783. Hair Butter 784. Hair Cream 785. Hair Lotion 786. Hair Spray 787. Hair Gel 788. Hair Wax 789. Hair Pomade 790. Hair Butter 791. Hair Cream 792. Hair Lotion 793. Hair Spray 794. Hair Gel 795. Hair Wax 796. Hair Pomade 797. Hair Butter 798. Hair Cream 799. Hair Lotion 800. Hair Spray 801. Hair Gel 802. Hair Wax 803. Hair Pomade 804. Hair Butter 805. Hair Cream 806. Hair Lotion 807. Hair Spray 808. Hair Gel 809. Hair Wax 810. Hair Pomade 811. Hair Butter 812. Hair Cream 813. Hair Lotion 814. Hair Spray 815. Hair Gel 816. Hair Wax 817. Hair Pomade 818. Hair Butter 819. Hair Cream 820. Hair Lotion 821. Hair Spray 822. Hair Gel 823. Hair Wax 824. Hair Pomade 825. Hair Butter 826. Hair Cream 827. Hair Lotion 828. Hair Spray 829. Hair Gel 830. Hair Wax 831. Hair Pomade 832. Hair Butter 833. Hair Cream 834. Hair Lotion 835. Hair Spray 836. Hair Gel 837. Hair Wax 838. Hair Pomade 839. Hair Butter 840. Hair Cream 841. Hair Lotion 842. Hair Spray 843. Hair Gel 844. Hair Wax 845. Hair Pomade 846. Hair Butter 847. Hair Cream 848. Hair Lotion 849. Hair Spray 850. Hair Gel 851. Hair Wax 852. Hair Pomade 853. Hair Butter 854. Hair Cream 855. Hair Lotion 856. Hair Spray 857. Hair Gel 858. Hair Wax 859. Hair Pomade 860. Hair Butter 861. Hair Cream 862. Hair Lotion 863. Hair Spray 864. Hair Gel 865. Hair Wax 866. Hair Pomade 867. Hair Butter 868. Hair Cream 869. Hair Lotion 870. Hair Spray 871. Hair Gel 872. Hair Wax 873. Hair Pomade 874. Hair Butter 875. Hair Cream 876. Hair Lotion 877. Hair Spray 878. Hair Gel 879. Hair Wax 880. Hair Pomade 881. Hair Butter 882. Hair Cream 883. Hair Lotion 884. Hair Spray 885. Hair Gel 886. Hair Wax 887. Hair Pomade 888. Hair Butter 889. Hair Cream 890. Hair Lotion 891. Hair Spray 892. Hair Gel 893. Hair Wax 894. Hair Pomade 895. Hair Butter 896. Hair Cream 897. Hair Lotion 898. Hair Spray 899. Hair Gel 900. Hair Wax 901. Hair Pomade 902. Hair Butter 903. Hair Cream 904. Hair Lotion 905. Hair Spray 906. Hair Gel 907. Hair Wax 908. Hair Pomade 909. Hair Butter 910. Hair Cream 911. Hair Lotion 912. Hair Spray 913. Hair Gel 914. Hair Wax 915. Hair Pomade 916. Hair Butter 917. Hair Cream 918. Hair Lotion 919. Hair Spray 920. Hair Gel 921. Hair Wax 922. Hair Pomade 923. Hair Butter 924. Hair Cream 925. Hair Lotion 926. Hair Spray 927. Hair Gel 928. Hair Wax 929. Hair Pomade 930. Hair Butter 931. Hair Cream 932. Hair Lotion 933. Hair Spray 934. Hair Gel 935. Hair Wax 936. Hair Pomade 937. Hair Butter 938. Hair Cream 939. Hair Lotion 940. Hair Spray 941. Hair Gel 942. Hair Wax 943. Hair Pomade 944. Hair Butter 945. Hair Cream 946. Hair Lotion 947. Hair Spray 948. Hair Gel 949. Hair Wax 950. Hair Pomade 951. 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Hair Pomade 1014. Hair Butter 1015. Hair Cream 1016. Hair Lotion 1017. Hair Spray 1018. Hair Gel 1019. Hair Wax 1020. Hair Pomade 1021. Hair Butter 1022. Hair Cream 1023. Hair Lotion 1024. Hair Spray 1025. Hair Gel 1026. Hair Wax 1027. Hair Pomade 1028. Hair Butter 1029. Hair Cream 1030. Hair Lotion 1031. Hair Spray 1032. Hair Gel 1033. Hair Wax 1034. Hair Pomade 1035. Hair Butter 1036. Hair Cream 1037. Hair Lotion 1038. Hair Spray 1039. Hair Gel 1040. Hair Wax 1041. Hair Pomade 1042. Hair Butter 1043. Hair Cream 1044. Hair Lotion 1045. Hair Spray 1046. Hair Gel 1047. Hair Wax 1048. Hair Pomade 1049. Hair Butter 1050. Hair Cream 1051. Hair Lotion 1052. Hair Spray 1053. Hair Gel 1054. Hair Wax 1055. Hair Pomade 1056. Hair Butter 1057. Hair Cream 1058. Hair Lotion 1059. Hair Spray 1060. Hair Gel 1061. Hair Wax 1062. Hair Pomade 1063. Hair Butter 1064. Hair Cream 1065. Hair Lotion 1066. Hair Spray 1067. Hair Gel 1068. Hair Wax 1069. Hair Pomade 1070. Hair Butter 1071. Hair Cream 1072. Hair Lotion 1073. Hair Spray 1074. Hair Gel 1075. Hair Wax 1076. Hair Pomade 1077. Hair Butter 1078. Hair Cream 1079. Hair Lotion 1080. Hair Spray 1081. Hair Gel 1082. Hair Wax 1083. Hair Pomade 1084. Hair Butter 1085. Hair Cream 1086. Hair Lotion 1087. Hair Spray 1088. Hair Gel 1089. Hair Wax 1090. Hair Pomade 1091. Hair Butter 1092. Hair Cream 1093. Hair Lotion 1094. Hair Spray 1095. Hair Gel 1096. Hair Wax 1097. Hair Pomade 1098. Hair Butter 1099. Hair Cream 1100. Hair Lotion 1101. Hair Spray 1102. Hair Gel 1103. Hair Wax 1104. Hair Pomade 1105. Hair Butter 1106. Hair Cream 1107. Hair Lotion 1108. Hair Spray 1109. Hair Gel 1110. Hair Wax 1111. Hair Pomade 1112. Hair Butter 1113. Hair Cream 1114. Hair Lotion 1115. Hair Spray 1116. Hair Gel 1117. Hair Wax 1118. Hair Pomade 1119. Hair Butter 1120. Hair Cream 1121. Hair Lotion 1122. Hair Spray 1123. Hair Gel 1124. Hair Wax 1125. Hair Pomade 1126. Hair Butter 1127. Hair Cream 1128. Hair Lotion 1129. Hair Spray 1130. Hair Gel 1131. Hair Wax 1132. Hair Pomade 1133. Hair Butter 1134. Hair Cream 1135. Hair Lotion 1136. Hair Spray 1137. Hair Gel 1138. Hair Wax 1139. Hair Pomade 1140. Hair Butter 1141. Hair Cream 1142. Hair Lotion 1143. Hair Spray 1144. Hair Gel 1145. Hair Wax 1146. Hair Pomade 1147. Hair Butter 1148. Hair Cream 1149. Hair Lotion 1150. Hair Spray 1151. Hair Gel 1152. Hair Wax 1153. Hair Pomade 1154. Hair Butter 1155. Hair Cream 1156. Hair Lotion 1157. Hair Spray 1158. Hair Gel 1159. Hair Wax 1160. Hair Pomade 1161. Hair Butter 1162. Hair Cream 1163. Hair Lotion 1164. Hair Spray 1165. Hair Gel 1166. Hair Wax 1167. Hair Pomade 1168. Hair Butter 1169. Hair Cream 1170. Hair Lotion 1171. Hair Spray 1172. Hair Gel 1173. Hair Wax 1174. Hair Pomade 1175. Hair Butter 1176. Hair Cream 1177. Hair Lotion 1178. Hair Spray 1179. Hair Gel 1180. Hair Wax 1181. Hair Pomade 1182. Hair Butter 1183. Hair Cream 1184. Hair Lotion 1185. Hair Spray 1186. Hair Gel 1187. Hair Wax 1188. Hair Pomade 1189. Hair Butter 1190. Hair Cream 1191. Hair Lotion 1192. Hair Spray 1193. Hair Gel 1194. Hair Wax 1195. Hair Pomade 1196. Hair Butter 1197. Hair Cream 1198. Hair Lotion 1199. Hair Spray 1200. Hair Gel 1201. Hair Wax 1202. Hair Pomade 1203. Hair Butter 1204. Hair Cream 1205. Hair Lotion 1206. Hair Spray 1207. Hair Gel 1208. Hair Wax 1209. Hair Pomade 1210. Hair Butter 1211. Hair Cream 1212. Hair Lotion 1213. Hair Spray 1214. Hair Gel 1215. Hair Wax 1216. Hair Pomade 1217. Hair Butter 1218. Hair Cream 1219. Hair Lotion 1220. Hair Spray 1221. Hair Gel 1222. Hair Wax 1223. Hair Pomade 1224. Hair Butter 1225. Hair Cream 1226. Hair Lotion 1227. Hair Spray 1228. Hair Gel 1229. Hair Wax 1230. Hair Pomade 1231. Hair Butter 1232. Hair Cream 1233. Hair Lotion 1234. Hair Spray 1235. Hair Gel 1236. Hair Wax 1237. Hair Pomade 1238. Hair Butter 1239. Hair Cream 1240. Hair Lotion 1241. Hair Spray 1242. Hair Gel 1243. Hair Wax 1244. Hair Pomade 1245. Hair Butter 1246. Hair Cream 1247. Hair Lotion 1248. Hair Spray 1249. Hair Gel 1250. Hair Wax 1251. Hair Pom

Peinture Lumineuse



La peinture lumineuse sur les aiguilles et le cadran de ce réveil du milieu du XX^{ème} siècle contient une petite quantité de bromure de radium mélangé à du sulfide de zinc. Ce dernier convertit l'énergie des particules α émises par le radium en lumière visible. Ainsi la peinture au radium n'a pas besoin d'être rechargée à la lumière comme c'est le cas pour les cadrans modernes. Le temps de demi-vie du radium est de 1600 ans ce qui signifie que la peinture continuera à briller pendant de longs siècles.

Malheureusement elle continuera aussi à produire le dangereux gaz radon, ce qui est une des multiples raisons pour lesquels l'utilisation du radium dans les peintures lumineuses a cessé.