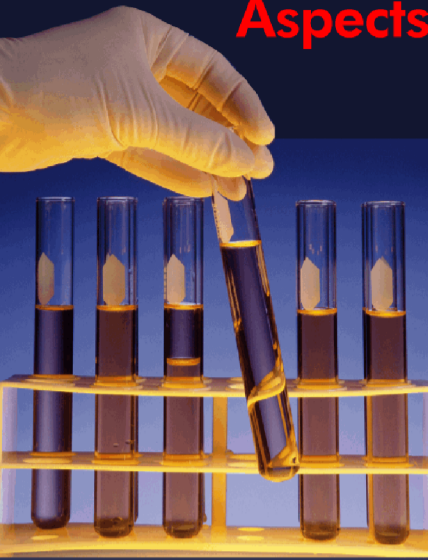


# Occupational exposure to manganese in Germany: Aspects of toxicity, measurements and prevention.



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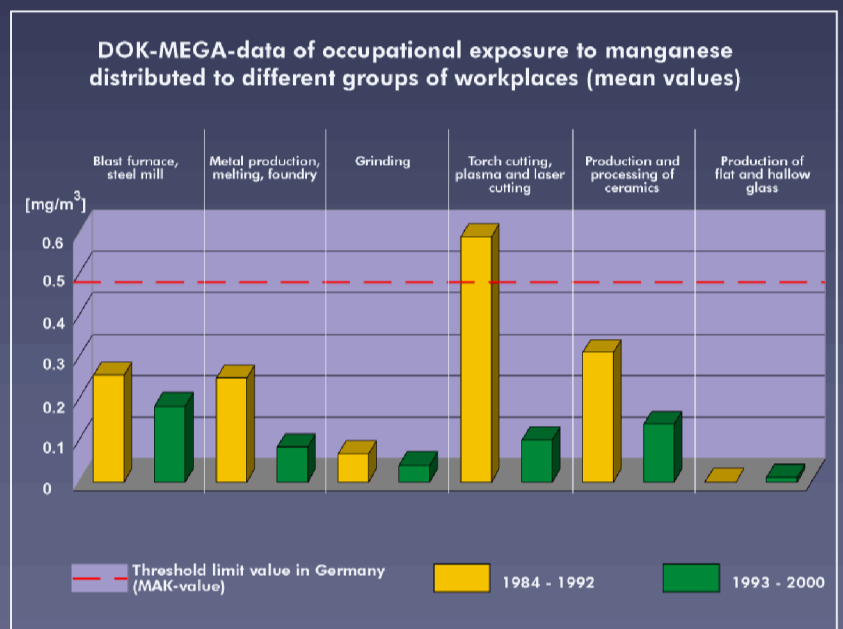
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## Statistical analysis of occupational manganese exposure

Beside its importance for maintaining main functions in life manganese is recognised to be a serious health hazard [1, 2]. With the increased use of manganese in industry, rising numbers of cases of occupational exposure to manganese are appearing, e. g., before 1966 more than 500 cases world-wide had been reported. A statistical appraisal was conducted, based on data from the DOK-MEGA-database of the Berufsgenossenschaften's Institute for Occupational Safety (BIA) which documented extensive measurements within the framework of the Berufsgenossenschaften's measurement system for hazardous substances for 25 years [3]. Within the data period from 1975 to 2000 a total of 2713 manganese measurements were

collected. For the majority of workplaces -with the exception of some welding activities-, more than 90 % of the measurement readings are below the threshold limit value (MAK-value) of 0.5 mg/m<sup>3</sup>. This is in accordance with a former preliminary investigation [4].



| Diseases caused by manganese                      | 1999 | 1998 | 1997 | 1996 | 1995 | 1994 |
|---|------|------|------|------|------|------|
| Reported cases of suspected occupational diseases | 7    | 3    | 3    | 3    | 3    | 8    |
| Cases of recognised occupational diseases         | 2    | -    | -    | -    | -    | -    |
| New pensions                                      | 1    | -    | -    | -    | 1    | -    |

## Occupational diseases and pensions

The evaluation of the BK-DOK-database with regard to neurological diseases having lead to new pensions in the period 1978 to 1999 revealed only four cases related to manganese or its compounds (in 1980, 1993, 1995 and 1999). Further data showing the very limited number of cases of suspected and recognised occupational diseases in connection with manganese are shown in the Table.

## Prevention

For the prevention of health hazards to manganese in Germany the atmospheric limit value for manganese and inorganic manganese-compounds was lowered from 5 mg/m<sup>3</sup> (total dust) to 0.5 mg/m<sup>3</sup> (inhalable fraction). In parallel, the limit value for Mn<sub>3</sub>O<sub>4</sub> of 1 mg/m<sup>3</sup> (total dust) was abolished. The exposure peak limit was fixed at four times the limit value concentration (taking the mean over a period of 15 minutes). The duration of increased exposure must not exceed one hour.

## Summary

Manganism is of minor importance in Germany for the last decades. The threshold limit value in Germany (MAK) is set to 0.5 mg/m<sup>3</sup>. A statistical appraisal of workplace exposure to manganese and its compounds in Germany revealed decreasing values from 1975 up to now. For most relevant occupational areas (blast furnace, foundry, torch cutting, welding, glass and ceramics production etc.) more than 90% of the measurement readings are below the limit value of 0.5 mg/m<sup>3</sup>. Due to preventive measures manganese is a minor factor in occupational exposure in Germany.

References:  
[1] Pflaum, W., H. Blum, G. Hedenberg (1990): Vorkommen und Messung von Mangan- und Manganverbindungen am Arbeitsplatz. *Staub-Reinl. Luft* 50, 307 - 316. [2] World Health Organization (1981): Manganese. *Environmental Health Criteria* Vol. 17, Geneva, WHO. [3] Stamm, R. (2000): MEGA-Datenbank: Eine Millenium data since 1972. *Appl. Occup. Environ. Hyg.* 16, 157 - 163. [4] Pflaum, W. (1985): Mangan und Manganverbindungen am Arbeitsplatz. In: *Berufsgenossenschaftliches Institut für Arbeitssicherheit - BIA (Ed.), BIA Handbuch: Sicherheit und Gesundheitsschutz am Arbeitsplatz, Band 3*, Fachschriften-Verlag, Bielefeld, 32, Hg. W/1996, No. 120212.