

gol128@sptums.com :

(CIS IOM)
NIOSH

()
± / (PVC)
() :

(P< /)

IOM

IOM "

(/ ± /) (P< /)
(/ ± /) (/ ± /)
(/ ± /) (/ ± /)
CIS (P> /)

Kerr)

(et al. 2002; James and Zalk 1998

National

Institute of Occupational Safety and Health (NIOSH), U.S. Environmental Protection Agency (EPA), International Agency for Research on Cancer (IARC)

(EPA 1998)

Ashley et al. 2003; James and Zalk 1998;)
Kriech et al. 2004; Tsai and Vincent 2001;
(Predicala and Maghirang 2003

Occupational "
Safety and Health Administration (OSHA)

OSHA, ID-) ()
(215 1998; NIOSH 7600 1994

"

Conical Inhalable Sampler (CIS)

(

(EPA 1998)

"
(Open-face)

Clinkenbeard) (Closed-face)
(et al. 2002

Baldwin and)

/(
(Maynard 1998

American Conference of Governmental Industrial Hyginists(ACGIH)

()

(TA2 Air Flow) ;
/
(Kuo et al. 1997) ;
: (: ()
()
(Tirgar et al. 2006)
: ()
SAS
: (Institute of Occupational Medicine (IOM)
NIOSH (NIOSH 7600 1994) CIS
/
(Side by side)
Beckman) PVC
DU M.S.A ()
SKC
/ / / / / / / / PCXR3
± /
/ CIS
/

($p < /$)

/ \pm /

IOM

IOM

CIS

:

:

:

)

(

)

(

(Chen et al. 2002)

:

:

)

(

(Werner et al. 1999)

()

)

IOM

)

(

(

IOM

)

$$E_{IOM} = B \times E_{37mm}$$

E_{IOM}

(

B

CIS

-

IOM

() Kuo . IOM
 CIS % % %

(Kuo et al. 1997) IOM
 IOM

CIS :

) ()
 (

IOM IOM

(% /) (% /) IOM
 Ashley et al. 2003;) (% /) CIS
 (Shin and Paik 2000 IOM

CIS
 :

:" (CIS IOM)
 .(P< /)
 (Kuo et al. 1997))
 (Kenny et al. 1999) Kenny ()
 GSP IOM

GSP

:

/

IOM CIS (Bonin et al. 1995)

CIS (Li et al. 2000)

IOM

/ /

Li CIS

. (Li et al. 2000)

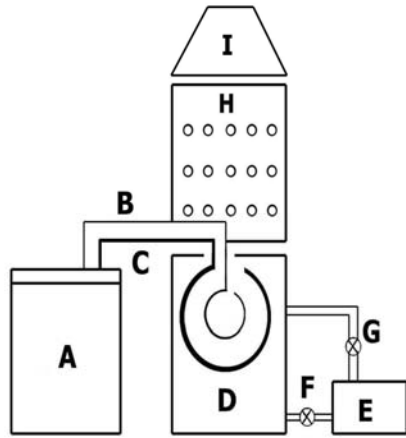
CIS IOM CIS) (

IOM

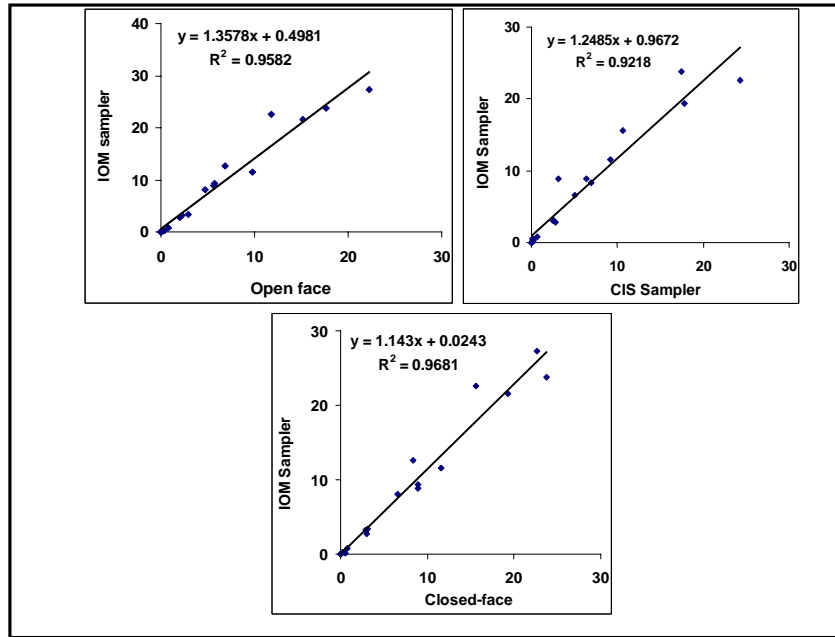
IOM

.(Kenny et al. 1997)

(/ ")



E D C B () A
 I H G F



IOM

CIS

(min)	(cm)	(g/l)
-------	------	-------

(N =)

	SD ($\mu\text{g}/\text{m}^3$)		($\mu\text{g}/\text{m}^3$)		($\mu\text{g}/\text{m}^3$)	
/	/	/	/	/	/	Close-face
/	/	/	/	/	/	Open-face
/	/	/	/	/	/	IOM
/	/	/	/	/	/	CIS

IOM**CIS**

		IOM		
	R^2	SE/B	B	
/	/	/	/	CIS
/	/	/	/	
/	/	/	/	

:B

: SE/B

: R^2

References:

- Ashley, K., Howe, A.M., Demange, M. and Nygeren, O., 2003. Sampling and analysis consideration for determination of hexavalent chromium in workplace air. *J. Environ. Monit.*, **5**(1), pp.707-716.
- Baldwin, P.E.J. and Maynard, A.D., 1998. A survey of wind speed in indoor workplaces. *Ann. Occup. Hyg.*, **42**(5), pp.303-313.
- Bonin, M.P., Flower, L.W., Renzi, R.F. and Peng, L.W., 1995. Size and concentration measurements of particle produced in commercial Chromium plating Processes. *Air Waste Manage. Assoc. J.*, **45**(11), pp. 902-907.
- Chen, G.L., Guo, Y.L., Tsai, P.J. and Su, L.F., 2002. Use of inhalable Cr⁺⁶ exposure to characterized urinary chromium concentrations in plating industry workers. *J. Occupational Health*, **44**(1), pp. 46-52.
- Clinkenbeard, R.E., England, E.C., Johanson, D.L., Esment, N.A. and Hall, T.A., 2002. A Field comparison of the IOM inhalable aerosol sampler and a modified 37-mm Cassette. *Appl. Occup. Environ. Hyg. J.*, **17**(9), pp.622-627.
- James, R. and Zalk, M., 1998. Comparison of total dust sampling methods for evaluation of airborne wood dust. *Appl. Occup. Environ. Hyg. J.*, **13**(3), pp.177-182.
- Kenny, L.C., Aitken, R.J., Baldwin, P.E.J., Beaumont, G.C. and Maynard, A.D., 1999. The sampling efficiency of personal inhalable aerosol samplers in low air movement environments. *J. Aerosol. Sci.*, **30**(5), pp.627-38.
- Kenny, L.C., Aitken, R. and chalmers, C.P., 1997. A collaborative European study of personal inhalable aerosol sampler performance. *Ann. Occup. Hyg. J.*, **41**(2), pp.135-153.
- Kerr, S.M., Muranko, H.J., and Vincent, J.H., 2002. Personal sampling for inhalable aerosol exposure of carbon black manufacturing industry workers. *Appl. Occup. Environ. Hyg. J.*, **17**(10), pp.681-692.
- Kriech, A.J., Osborn, L.V., Wissel, H.L., Kurek, J.T., Sweeney, B.J. and Pregerine, C.J., 2004. Total versus inhalable sampler comparison study for determination of asphalt fume exposures within the road paving industry. *Environ. Monit. J.*, **6**(10), pp.827-833.
- Kuo, H.W., Lai, J.S. and Lin, T.I., 1997. Concentration and Size distribution of airborne Hexavalent Chromium in electroplating Factories. *Am. Ind. Hyg. Assoc. J.*, **58**(1), pp. 29-32.
- Li, S.N., Lundgren, D.A. and Rovell-Rixx, D., 2000. Evaluation of six inhalable aerosol samplers. *Am. Ind. Hyg. Assoc. J.*, **61**(4), pp.506-16.
- NIOSH Analytical manual of analytical methods (NAMA), 1994. chromium hexavalent 7600.
- Occupational safety and health administration (OSHA) 1998. Hexavalent Chromium IN Workplace Atmosphere, US Dept. of labor/osha method NO. ID-215, osha, salt lake city ut.
- Predicala, B.Z. and Maghirang, R.G., 2003. Field comparison of inhalable and Total dust samplers for assessing airborne dust in swine confinement barns. *Appl. Occup. Environ. Hyg. J.*, **18**(9), pp.694-701.
- Shin, Y.C. and Paik, N.W., 2000. Reduction of hexavalent chromium collected on PVC filters. *Am. Ind. Hyg. J.*, **61**(44), pp.563-567.
- Tirgar, A., Golbabei, F., Nourijelyani, K., Shahtaheri, S.J., Ganjali, M.R. and Hamed, J., 2006. Design and performance of chromium mist generator. *J. Braz. Chem. Soc.*, **17**(2), pp.342-347.
- Tsai, P.J. and Vincent, J.H., 2001. A STUDY of worker's exposures to the inhalable and total aerosol fraction in the primary nickel to simulate personal sampling: *Ann. Occup. Hyg. J.*, **45**(5), pp.385-394.
- U.S. Environmental Protection Agency (EPA), 1998. Toxicological review of hexavalent chromium (CAS NO.18540-29-9).
- Werner M.A., Thomassen V., Hetland, S., Berge, S., Norseth, T. and Vincent, J.H. (1999) Correlation of urinary nickel excretion with observed 'Total' and inhalable aerosol exposure on nickel refinery workers. *J. Environ. Monit.* **1**(6): 557-562.

