[1] [2]

(1. 1061, 2. 07)

1949 Polge Smiht[1]

1972 Whittingham[2]

[2-6]

20 50

Blxaetr(1953)[7]

20 ,

1

(cryobiology)

[8] ( )

0 60

; 60

(2000)[9]

, ,

,

80%

90%

(-15 ~-50)

,

,

4

2

2.1

,

2.1.1

(2~5 · min-1) (0.05~0.5 · min-1)

-60 1~2 · min-1 -85 10min -196

Zhang [10]1989

25%

2.1.2

0 -60

2~5 · min-1 [11]

[12] 1997

2.1.3

[13]

(1991)[14]

(1996)[15]

(

2002)[16] (2003)[17] GP Met

Chen Tian(2005)[18] PG Met

Chao [19] DAP2B

(2mol ·L-1DMSO+1mol ·L-1 +3mol ·L-1) VSI (20.5% DMSO+15.5%

+10%) Zhang Rawson[20]

3mol · L-1

[21]

70min 2005 [22]

PMDD(2% PVP)

[23] 35%PMD 5%

12h 4 4

15 11

3

(1 6mnI)

3.1

[24],

DMSO

(1~6mm) 2

Harvey 1982

2h 23% DMSO

[25] Robertson [26]

1mol · L-1

2mol · L-1 2mol · L-1 [27] ,

0 DMSO 16% 20%

4% 5% 12% 12% Zhang Rawson[20]

1,2- , 22 0

3mol · L-1 1,2 5mol · L-1 30min,

3.2

(sc

aneposocellatu)s (Robertson and Lwaenee

1988)[28] DMSO

DMOS (1992)[27] Zhang (1995)[29]

Hagedorn (1997)[30] (

1.25 2h) (50% 100%) Routray

2002 [31] DMSO(0.6-2.5M) DMSO

Zhang 1993

[32]

(1997)[12] 40 25 4

Stoss

(1983)[41] 1mol/1DMOS 0.5 0.25mo/l1DMSO

5min (1997)

4

(zhangetal 1989 1997 2002

2003 2003 2003)

4.1

Knight 1986 [42] Carpenter Harsen[43]

Rubinsky [44] ,

25% 82%

4.2

,

,

4.3

Calvi Maisse[45] Ballar6A-6C

88%~95%

[46]

4.4

Vanper 1993

Oteme 1998

	( )	%	
	-20	6.4	Stoss,1983
	-25	10~26	Erdshl,1986
	-30(15min),-196(20min)	13.4,18.7	Zhang,1989
	-25 -30	43.8	Zhang,1993
	-40(16min)	14	,1994
	-30(15min)	12.5	,1994
	-100(60min), -196(120min)	10	,1997
	-100(60min)	15	,1997
	-100(60min)	10	1997
	-196	88~95	Calvi 1997

:

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